THE

Malayan Agricultural Journal.

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EDITORIAL.

Rice Production.

Following precedent, we again devote the December number of this journal to a review of the work of the Department of Agriculture during the past year on rice production. While perhaps few of our readers are actively engaged in padi planting, yet the welfare of the country is so intimately influenced by this industry that the subject should be, and we believe is, of interest to our readers. In whatever walk of life, the resident in this country may be affected—in his trade, or his personal life—at any time by the fact that Malaya produces only about 40 per cent. of her requirements of a cereal which is the staple diet of about 99 per cent. of her population.

The main object of the investigations described in the following pages is to increase the quantity of rice per acre, and to improve its milling quality. Success in the first object betters the conditions of life of the growers and is an encouragement to the development of new areas, while any improvement of the milling quality not only results in a higher price for the grower, but enables the country to cater for those who demand a high-quality rice.

Much of the work of the Department is directed towards the selection of varieties of padi to suit the conditions (of soil, irrigation and climate) of particular areas. In this direction the investigators come into close touch with the Drainage and Irrigation Department on the one hand, and of the Administrative Branch on the other hand. The former Department has been actively engaged in the improvement of existing areas and the development of new areas, while a material function of the Department of Agriculture has been to advise on soils, when improvements are required, times of planting as a result of experiments on the spot, the most suitable varieties to grow, and to supply selected seed to the growers. Such work as this may not be spectacular, but it is essential and contributes materially towards the successful efforts which are being made to render Malaya more independent of external sources of this essential food.

Success in padi growing depends in large measure on concerted action amongst growers. It must be remembered that individual holdings are of only a few acres and it is sometimes difficult to obtain sufficient unity of action to ensure that the different operations of cultivation are completed at the same time by all growers, so that the irrigation may be effective and also that the loss due to pests may be

reduced to a minimum. The officers of the Field Branch assist the Administrative officers in the fixing of dates for cultivation and exercise their influence amongst growers to ensure the proper observance of planting dates. Such duties as these are not discussed in the following pages, but they are of almost equal importance to the experimental work, for without the close attention to details of planting, and collaboration with other Departments concerned with padi planting, the results of the valuable experiments could not be translated ultimately into terms of increased rice production in Malaya.

Padi selection and varietal trials during the season 1936-37 are recorded in the first of two articles which appear in this number. Although the season did not prove particularly favourable for heavy crops, satisfactory progress was reported at most Experiment Stations in the selection of local varieties, in the introduction of suitable varieties and in other problems such as that of ascertaining the most suitable dates for sowing the various selected strains.

Renewed efforts to solve the problem of successful manuring of the crop have been made during the year, and are described in the second article in this number. While some of the treatments indicate improved yields, the results are not sufficiently convincing to justify any recommendations on the subject of manuring.

Original Articles.

PADI SELECTION AND VARIETAL TRIALS 1936-1937

Compiled by
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This report is a summary of results of varietal trials and selection work carried out by the Field Branch of the Department of Agriculture in twelve States and Settlements in the Malay Peninsula and in Borneo during the 1936-37 season.

The distribution of Experiment Test Stations can be seen on the accompanying map, and is as follows:—

Perlis	...	2 Test Stations.
Kedah	...	Telok Chengai Experiment Station and 6 Test Stations.
Province Wellesley	...	2 Test Stations.
Perak	...	Titi Serong and Talang Experiment Stations and 11 Test Stations.
Selangor	...	5 Test Stations.
Negri Sembilan	...	5 Test Stations.
Malacca	...	Pulau Gadong Experiment Station.
Pahang	...	6 Test Stations.
Johore	...	3 Test Stations.
Kelantan	...	Kota Bahru Experiment Station and 2 Test Stations.
Brunei Labuan		5 Test Stations, one or two of which will be developed as selection Experiment Stations.

A total of 5 Experiment Stations and 45 Test Stations.

As formerly,* standard Latin Squares were used (except where otherwise stated) and the minimum significant difference between any two strains has been estimated on a basis of Fisher's "t" test for 95 per cent. probability.

PERLIS.

Test Stations at Kampong Salang and at Seriab, commenced season 1935-36, were maintained under the supervision of the Principal Agricultural Officer, Kedah, and the Malay Padi Inspector, Perlis.

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* *Malayan Agricultural Journal*, Vol. XXIV, No. 12, 1936.

* *Malayan Agricultural Journal*, Vol. XXIV, No. 2, 1936.

* *Malayan Agricultural Journal*, Vol. XXIII, No. 1, 1935.

Kampong Salang		Batu Hampar, Seriab.	
Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Siam 29 ...	31.4	Siam 29 ...	23.7
Nachin 10 ...	30.8	Nachin 10 ...	21.3
Radin China 4 ...	30.7	Radin China 4 ...	19.9
Siam 76 ...	30.1	Chubai 18 ...	20.8
Radin Pulau ...	28.6	To' Awang ...	23.5
S.D.* 1.2 M.S.D. 1.8 lbs.		S.D. 0.9 M.S.D. 1.3 lbs.	

The above yields are better for Kampong Salang and poorer for Batu Hampar than in the previous seasons. Siam 29 is again the best at both Stations and Nachin 10 is also consistent. To' Awang at Seriab is second to Siam 29 both seasons and it would seem to be worth while selecting from this variety.

KEDAH.

Telok Chengai Experiment Station.

Pure Line Selection.—Further selections of the variety To' Seman were made and eight lines were kept for final trial on light soil at Langgar Test Station, from which locality this variety was originally obtained. Four of these lines have given, over a period of four seasons, an average weight of grain of more than 100 grammes per plant.

The varieties Nakon and Kuala have been discarded as they were of too short maturation period and too susceptible to pest attacks.

Two other local varieties, Serendah Sungei Dua and Raja Muda, were introduced to the Station for observation.

Varietal Trials.—No varietal trials were put down but multiplication plots of Siam 29, Siam 76, Mayang Ebos 80 and 88, Reyong 6 and 20, Radin China 4 and 17, Nachin 10, Radin Che Nah 28, Seraup 48, Seraup 15 and Chubai 18 were planted, with observation plots of Serendah Sungei Dua, Raja Muda, and To' Seman 7, 35, 42 and 88. An unprecedented, serious infection by *Sclerotium oryzae* occurred and most of the above strains, in whole or in part, in varying degrees suffered loss of grain.

* S.D. = Standard Deviation.
M.S.D. = Minimum Significant Difference.

PADI SELECTION AND EXPERIMENT STATIONS MALAYA
BRUNEI AND LABUAN ARE NOT INCLUDED.
SIAM
LANGKAWI IS.
PERLIS
X LANGKAWI
X KAMPONG SALANG
X SERIAB
X JITRA
X LANGGAR
O TELOK CHENGAI
X SALA KANAN
X PULAI
X RANTAU PANJANG
KEDAH
PENANG
GLUGOR X
PROV. WELLESLEY
X BUKIT MERAH
X LENGGONG
X SUNGEI ACHEH
TANJONG PIANDANG X
O TITI SERONG
KUALA KURAU X
X KAMPONG KEDAH
X BRIAH
X BAGAN SERAI
X Sg KEPAR
X SELINSING
X BUKIT GANTANG
O TALANG
PERAK
X BRUAS
X Sg. MANIK
O KOTA BAHRU
X BACHOK
PASIR PUTEH X
KELANTAN
TRENGGANU
X KUALA LIPIS
X DONG
PAHANG
X PANCHANG BEDENA
X Sg. HAJI DURANI
X TANJONG KARANG
SELANGOR
X KUANG
X TEMERLOH
X KERDAU
X Sg. BLAT
X BAWANG
X PEKAN
X KAJANG
X ULU KLAWANG
X AMPANG TINGGI
NEGRI SEMBILAN
X KENDONG
MALACCA
X JEMENTAH
O PULAU GADONG
X TANGKAK
X TENGLU
JOHORE
SINGAPORE
O EXPERIMENT STATIONS
X TEST PLOTS
100°
101°
102°
103°
104°
6°
5°
4°
3°
2°

To' Seman selection Nos. 7, 35, 42 and 88 each gave just under 400 gantangs per acre. They were not infected with *Sclerotium oryzae*, but lodged. Siam 29 and Reyong 20 were also not infected but also lodged, while Siam 76, Reyong 6, Nachin 10 and Raja Muda crops were affected by loss of grain from both causes.

A comparison of yields cannot, in the circumstances, be of any reliable value; they were, however, as follows:—Siam 29—460 gantangs* per acre; Siam 76, Mayang Ebos 88 and 80, Reyong 6 and 20, Radin China 17 and 4 and Serendah Sungei Dua—approximately 400 gantangs per acre; Nachin 10, Seraup 15 and 48, Radin Che Nah and Raja Muda—approximately 300 gantangs per acre, and Chubai 18, which was most severely infected with *Sclerotium oryzae*, gave less than 200 gantangs per acre.

Langgar Test Station.

Variety	Mean Yield per 1/120th acre in lbs.
Reyong 20 ...	23.2
Nachin 10 ...	22.4
Siam 29 ...	22.2
Siam 76 ...	22.2
By inspection, no significant differences.	

Same non-significant result as last season with yields all slightly higher.

Jitra Test Station.

Variety	Mean Yield per 1/120th acre in lbs.
Siam 76 ...	25.7
Mayang Ebos 80 ...	29.1
Siam 76 ...	28.5
Reyong 6 ...	25.2 (Rat damage)
S.D. = 3.7 No significant differences.	

* Gantang = One Imperial Gallon. One gantang of padi varies in weight, according to the size and shape of the grains, between 5 and 6 lbs.

Results very similar to those of last season.

Sala Kanan Test Station.

Variety	Mean Yield per 1/120th acre in lbs.
Siam 76 ...	25.7
Mayang Ebos 88 ...	25.4
„ „ 80 ...	21.0
Reyong 6 ...	21.8
No analysis (see below)	

Yields were much lower than in the previous season, the crop having been seriously affected by attack of *Sclerotium oryzae*.

Rantau Panjang Test Station.

Variety	Mean Yield per 1/120th acre in lbs.
Nachin 10 ...	30.0
Siam 29 ...	30.0
Radin China 4 ...	27.4
Mayang Ebos 80 ...	29.6
Mayang Ebos 88 ...	26.0
No analysis (see below)	

Attack of *Sclerotium oryzae* was responsible for damage to plots, in particular to those of Radin China 4.

Langkawi Island Test Station.

Much damage by rats. No analysis. Nachin 10 gave very good yield on one undamaged plot. Other varieties on trial were Siam 29, Radin China 4 and Reyong 6.

Pulai Test Station.

Variety	Mean Yield per 1/120th acre in lbs.
Radin China 17 ...	44.8
Mayang Ebos 80 ...	44.7
Siam 76 ...	40.7
Siam 29 ...	40.2
Serandah Sungei Dua ...	39.8
S.D. 3.8 No significant differences.	

PENANG AND PROVINCE WELLESLEY.

Glugor Test Station.

Glugor Test Station on Penang Island has been very subject to flooding and rat damage, and it has now been abandoned as it has never been possible to secure results of any significance from varietal trials.

Bukit Merah Test Station.

(Province Wellesley).

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Reyong 6 ...	23.5	Reyong 6 ...	24.5
Radin China 4 ...	22.7	Mayang Ebos 203 ...	22.1
Reyong 20 ...	21.3	Nachin 66 ...	21.9
Reyong (Unselected) ...	19.2	Siam 29 ...	21.5
S.D. 1.0 M.S.D. 1.7 lbs.		S.D. 0.5 M.S.D. 0.9 lbs.	

Yields are remarkably even for all plots but Reyong 6 is consistently better than other varieties with which it has been tested, and while all yields are much better than for 1935-36 season, the varieties almost without exception appear in the same order of merit.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Milek Puteh 148 ...	22.9	Mayang Ebos 80 ...	24.6
Mayang Ebos 80 ...	22.7	„ „ 203 ...	23.8
Nachin 66 ...	22.4	„ „ 88 ...	21.6
Siam 29 ...	21.7	„ „ (local unselected) ...	22.2
By inspection, no significant differences.		S.D. 1.15 M.S.D. 2.0 lbs.	

The poor performance of Siam 29 this season was attributed to poor quality seed. Nachin 66 is a good yielding strain but will never be popular locally because the grain does not separate easily during threshing. Milek Puteh 148 has done well during the past two seasons. It has soft rice and is popular on that account but the grain is small and on this account is not suitable for general encouragement and distribution when there are other varieties which yield as well and produce better results in the mills.

Reyong 6, Mayang Ebos 203 and Siam 29 are now being distributed on the strength of the results of several seasons.

Observation Plots.—Varieties introduced from South India.

Variety	Quality of Straw	Type of Grain	Yield per acre in gantangs.	Maturation Period. days.
Sukadas	Weak	Long ...	340	145
T. 621	Weak	Short, thin ...	11	130
T. 650	Weak	Long ...	45	130
G. E. B. 24	Spreading	Average ...	240	137
Vankisanam	Erect	Slender ...	360	151
Coim. 2	Strong	Medium short ...	380	157
„ 5	„	„ ...	385	157
„ 7	„	„ ...	480	157

The best of these, the Coimbatore strains and Vankisanam together with G.E.B. 24, will be kept for Latin Square trials.

Sungei Acheh Test Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Seraup 48 ...	19.5	Seraup 48 ...	22.9
„ 68 ...	22.5	„ 36 ...	25.0
„ 15 ...	24.6	„ 371 ...	26.0
Mayang Kuning 48 ...	29.1	„ 146 ...	26.3
S.D. 2.3 M.S.D. 4.0 lbs.		S.D. 1.9 M.S.D. 3.3 lbs.	

This Station in the south of Province Wellesley, adjoining Krian, has been established for the first time this season. Conditions are different from those in the northern half of the Province, and are identical with those of north-west Krian with fairly deep soils and plentiful water supply suitable for strains of Seraup types.

PERAK.

Titi Serong Experiment Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Seraup 371 ...	23.0	Hybrid F2 ...	17.0
„ 146 ...	22.8	„ F3 ...	10.1 (Rat damaged)
„ 48 ...	16.1	„ F8 ...	12.6 (Rat damaged)
Mayang Kuning 48 ...	19.0	„ F13 ...	15.5 (Rat damaged)
Machang 42 ...	17.2	Radin 13 ...	21.0
S.D. 1.4 M.S.D. 2.1 lbs.		Not analysed.	

Selection Work.—Selection work was commenced in Krian in 1936 and Seraup selections were first made at Titi Serong in 1917-18 season. From 1925 to 1931 Seraup 36 proved to be the best yielder closely followed by Seraup 48; for the next three seasons these positions were reversed, and since the 1934-35 season

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Machang 2 ...	19.1	Machang 7 ...	18.2
„ 4 ...	17.2	„ 8 ...	15.3
„ 5 ...	19.0	„ 9 ...	19.5
„ 6 ...	17.6	„ 10 ...	20.9
Seraup 48 ...	16.2	Seraup 48 ...	17.5
S.D. 0.87 M.S.D. 1.3 lbs.		S.D. 0.9 M.S.D. 1.3 lbs.	

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Tongkat 1 ...	20.8	Tongkat 7 ...	22.9
„ 2 ...	22.6	„ 9 ...	22.0
„ 3 ...	20.6	„ 10 ...	22.8
„ 4 ...	18.4	Seraup 48 ...	19.9
Seraup 48 ...	17.0		
S.D. 1.9 M.S.D. 2.7 lbs.		S.D. 0.8 M.S.D. 1.4 lbs.	

Seraup 371 and 146 have been very significantly better in Latin Square trials than either of the others. Seraup 48, however, is a more robust padi and continues to do well in the field and is popular, so that Ketua* plots of these three strains will be planted next season to obtain evidence of their respective merits under normal field conditions.

Machang 42 is a selection of light coloured Machang type, derived from coloured segregates from Seraup 36 which were grown under observation for several years. It has nowhere come up to the standard set by the best Seraup selections and will be discarded.

Selections of true Machang from Batu Kurau and Kuala Kurau are now being made. The third and fourth Latin Squares above are the first two Latin Square trials made with Batu Kurau Machang selections.

* Ketua = Headman.

Two other Latin Squares are those first made with selections of Tongkat, also from Batu Kurau.

Further selection work was carried out with Seraup from Kuala Kurau and other parts of Krian, and on Mayang Sa Batil sent from Penang.

Preliminary selection with local varieties, Seri Raja, and "Serendah" was carried out at Sungei Kapar, Selinsing and Bagan Serai Test Stations.

Pure lines of the following strains were maintained. Seraup 15, 36, 48, 52, 146, 371; Radin 1, 2, 4, 7, 11, 13; Mayang Kuning 48; Machang 42; Pahit 1, of which Radin 1 and 2 and Mayang Ebos 88 and 203 will be transferred to Talang Experiment Station, and Seraup 52, Machang 42 and Pahit 1 will now be finally discarded.

Kuala Kurau Test Station.

Variety	Mean Yield per 1/120th acre in lbs.		Average
	Square A.	Square B.	
Seraup 371 ...	29.8	32.6	31.2
„ 146 ...	31.1	30.5	30.8
„ 48 ...	20.5	20.2	20.3
Mayang Kuning 48 ...	26.8	22.6	24.7
Machang 42 ...	18.9	19.8	19.4
	S.D. 3.9 M.S.D. 3.7 lbs.		

Seraup 48 was slightly damaged by rats but making allowance for this and taking into consideration the similar results in duplicate squares, both this season and last season, there is little doubt now that Seraup 48 gives significantly poorer results than Seraups 371 and 146 in Latin Square trials in Kuala Kurau conditions. Proof that this is so, or otherwise, for general planting will be obtained next season. Machang 42 has, as elsewhere, continued to give comparatively poor yields and will be discarded.

Bagan Serai Test Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Seraup 371 ...	13.6	Seraup 48 ...	12.3
„ 146 ...	12.7	Mayang Kuning 48 ...	11.0
„ 48 ...	12.9	Machang 42 ...	8.5
Mayang Kuning 48 ...	10.9	Seri Raja ...	12.8
Machang 42 ...	10.9	"Serendah" ...	11.0
S.D. 0.96 M.S.D. 1.4 lbs.		S.D. 1.5 M.S.D. 2.2 lbs.	

Radin 13 ...	14.3	
„ 11 ...	15.0	
„ 7 ...	15.8	S.D. 1.75 M.S.D. 2.4 lbs.
„ 4 ...	15.5	
Mayang Ebos 88 ...	11.5	

Water supplies during preparation of *bendang** and planting of the nurseries were inadequate. Growth subsequently was not good and yields are definitely poor; conditions at harvest, also, were not favourable. Plots of Mayang Ebos 88 suffered some rat damage.

It is worthy of notice that Radin strains in general have yielded better than Seraups for the last two seasons at Bagan Serai.

Briah Test Station.

Severe drought during the nursery stage had a permanent effect on the growth of the padi. Siam 29, which has given the highest yields for three seasons, was badly lodged by wind storms just before harvest in January, but Seraup strains, in their second season, have given greatly improved yields. Radin varieties tried for the first time, gave the best yields this season though not as good as yields obtained with Siam 29 in previous seasons. With regard to Siam 29, although very satisfactory yields are usually obtained at the Test Station, it is not a popular strain with padi planters at Briah on account of its great liability to lodge. The crop is mostly cut by hired labour and the lodged padi increases the cost of reaping out of proportion to the gain from high yields. Local varieties introduced this season with a view to selection gave satisfactory returns.

* *Bendang* = irrigated padi-land. (Perak and northwards)
Sawah = „ „ (Selangor and southwards)

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Seraup 371 ...	17.7	Siam 29 ...	15.1
„ 146 ...	17.9	Mayang Ebos 88 ...	15.4
„ 48 ...	17.3	Radin 13 ...	15.8
Seri Sulam ...	17.8	Radin Che Ali ...	16.1
Seri Raja ...	17.6		
By inspection, no significant differences.		By inspection, no significant differences.	

Radin 4 ...	18.4	S.D. 2.6 M.S.D. 3.8 lbs.
„ 7 ...	18.4	
„ 11 ...	18.3	
„ 13 ...	18.3	
Siam 29 ...	15.8	

Selinsing Test Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Seraup 146 ...	11.8	Seri Raja ...	11.3
„ 371 ...	10.7	Dok Dik ...	9.3
„ 48 ...	10.4	Seri Panji ...	12.0
Mayang Kuning 48 ...	9.1	Pahit ...	11.7
Machang 42 ...	8.7	Seraup 48 ...	10.6
S.D. 1.8 M.S.D. 2.6 lbs.		S.D. 2.1 No significant differences.	

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Siam 29 ...	12.0	Mayang Ebos 88 ...	11.9
Radin 13 ...	10.3	Mayang Benna ...	11.3
„ 11 ...	10.2	Siam 29 ...	10.8
„ 7 ...	10.6	Selanjot ...	10.7
„ 4 ...	9.4		
S.D. 1.1. M.S.D. 1.6 lbs.		By inspection, no significant differences.	

Yields in Selinsing mukim are never very high, but this season, due to serious water shortage during the nursery stages and wet conditions at harvest, yields are the poorest of the past four seasons.

Sungei Kapar Test Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Seraup 48 ...	14.1	Seri Raja ...	15.4
„ 371 ...	11.8	Seraup 48 ...	13.7
„ 146 ...	11.6	Seraup 146 ...	11.6
Mayang Kuning 48 ...	9.7	Serendah ...	12.5
Machang 42 ...	8.3	Seri Panji ...	11.5
S.D. 1.1 M.S.D. 1.6 lbs.		S.D. 0.55 M.S.D. 0.8 lbs.	

Radin 4 ...	14.3	
„ 7 ...	14.5	
„ 13 ...	13.1	S.D. 0.9 M.S.D. 1.3 lbs.
„ 11 ...	12.6	
Mayang Ebos 88 ...	10.2	

A poor season was also experienced at Sungei Kapar, and rain before and during harvest reduced considerably the quantity of grain saved.

Seri Raja has proved as good or better than many selected strains and the selection work now being done on this variety at Titi Serong Experiment Station seems fully justified.

Kampong Kedah Test Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Radin 13 ...	18.6	Mayang Ebos 88 ...	15.9
„ 11 ...	17.8	Siam 29 ...	16.7
„ 7 ...	15.5	Radin 13 ...	16.6
„ 4 ...	16.4	„ 11 ...	17.2
„ 2 ...	13.8	„ 7 ...	15.1
S.D. 1.18 M.S.D. 1.7 lbs.		S.D. 1.22 M.S.D. 1.8 lbs.	

Radin 13 and 11 continue to be two of the best strains. Siam 29 is also satisfactory as regards yield but lodged, while yield from Mayang Ebos 88 is much below that of last season.

Although not typical deep Seraup land, most of the Kampong Kedah padi area is now planted with Seraup types of padi, and the Latin Squares for next season will include Seraup strains with Radins 13 and 11.

Talang Experiment Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Seraup 371 ...	26.3	Mayang Ebos 88 ...	26.5
„ 146 ...	25.0	„ „ 202 ...	25.8
„ 48 ...	25.2	„ „ 203 ...	25.8
Mayang Kuning 48 ...	24.8	„ „ 210 ...	24.3
(Averages of 3 squares) By inspection, no significant differences.		(Averages of 2 squares) S.D. 1.8 M.S.D. 2.1 lbs.	

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Reyong 20 ...	22.7	Radin 1 ...	26.5
Siam 29 ...	21.7	„ 11 ...	25.5
Siam 76 ...	21.0	„ 13 ...	24.1
Radin 13 ...	21.0	Siam 29 ...	23.3
By inspection, no significant differences.		S.D. 1.2 M.S.D. 2.1 lbs.	

The Seraup and Mayang Ebos strains have all done rather well. The district, generally, should be more suitable for Mayang Ebos rather than Seraups.

Radins 1 and 11 are shown to be significantly better than Siam 29, but this is a reversal of the results of the same Latin Squares the previous season.

Hybridization.—The remaining selections from the Radin 2 x Siam 29 hybrid were tested in Latin Squares with each of their parent strains.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Radin 2 ...	24.5	Siam 29 ...	20.7
Hybrid 1/3 ...	25.2	Hybrid 1/3 ...	22.9
„ 1/9 ...	27.4	„ 1/9 ...	22.4
„ 1/11 ...	23.8	„ 1/11 ...	22.6
„ 1/14 ...	24.4	„ 1/14 ...	20.2
S.D. 1.8 M.S.D. 2.6 lbs.		S.D. 1.5 M.S.D. 2.2 lbs.	

These hybrid selections appeared to be good in particular Nos. 3 and 9. The straw of hybrids was better and more erect than that of Siam 29—the main purpose of the hybridization—and the quality of the rice is remarkably good.

The trials show yields to be, at Talang, as good as or better than either of the parents, but it would be advisable to test them at Malacca and elsewhere, where Siam 29 is more usually one of the best yielding selections.

Other hybrid padi lines grown at Talang in 1935-36 were discarded at the beginning of this season. One selection from the Serendah 875 x Siam 29 hybrid, though it gave good yields, was proved to be very weak in straw.

Seed of reciprocal Nachin 10 x Nachin 27 crosses made at Talang in 1934-35, to try and combine the yields of N 10 with straw strength of N 27, was overlooked and lost, but it was not very promising material.

Pure Lines Under Observation.—These include local short term strains, hybrid selections, and introductions from South India.

Variety.	No. of Plants.	Av. Yield per Plant in grms.	Av. No. of Tillers.	*M.P. in days.
Serendah 824 ...	40	71.1	20.9	165
Serendah 875 ...	36	55.9	16.2	148
Siam 29 ...	44	73.4	16.7	176
Milek Puteh 148 ...	44	79.5	23.0	176
Radin Siak 34 ...	43	64.5	16.5	148
Hybrid 1/3 ...	45	67.7	18.8	177
„ 1/9 ...	45	76.1	19.4	176
„ 1/11 ...	43	52.6	18.2	170
„ 1/14 ...	45	71.2	15.8	177
Coim. 2 ...	45	60.4	28.5	163
Coim. 5 ...	45	68.5	37.5	167
Coim. 7 ...	45	54.1	30.1	161
Coim. 10 ...	45	21.9	14.4	141
T. 621 ...	45	16.7	18.1	145
T. 650 ...	45	28.2	15.0	161
G. E. B. ...	45	34.6	24.1	169
Vankisannam ...	42	55.9	25.3	164

* M.P. = Maturation Period, from date of sowing to date of reaping.

Selection Work.—Three varieties of padi are popular in many parts of the district and following preliminary selection in the field during the season 1935-36, thirty-one ear-to-row lines of Radin Che Mah, fourteen of Chantek Puteh and seven of Chantek Merah were planted for examination.

Bukit Gantang Test Station.

The highest average yields were in the Seraup trials, as for the past three seasons, and it is reasonable to suppose that Seraup strains are most suitable for many areas in Larut District, especially where irrigation facilities have been improved of recent years.

Variety.	Mean Yield per 1/120th acre in lbs.	
Seraup 146 ...	32.3	
„ 48 ...	25.4	Rat damage.
„ 15 ...	25.5	Rat damage.
Mayang Kuning 48 ...	31.8	

Siam 29 ...	26.1	
Siam 76 ...	25.4	
Radin 13 ...	23.6	
Mayang Ebos 88 ...	14.1	Severe rat damage.

Siam 29 ...	21.6	
Radin 13 ...	19.3	Rat damage.
Radin 11 ...	23.1	
Radin Che Mah ...	13.5	Severe rat damage.

Statistical analyses were not made on account of rat damage.

Lenggong Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Radin 13 ...	32.0	Radin 13 ...	18.5
Radin 11 ...	30.6	„ 11 ...	21.8
Siam 29 ...	23.7	„ 2 ...	15.1
Siam 76 ...	21.6	„ 1 ...	15.4
Reyong 20 ...	20.3		

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Mayang Ebos 208 ...	26.7	Seraup 36 ...	15.4
„ „ 88 ...	25.4	„ 68 ...	15.9
„ „ 210 ...	23.0	„ 371 ...	14.5
„ „ 203 ...	22.4	„ 48 ...	10.9
Siam 29 ...	21.7	Mayang Kuning 48 ...	12.7

No analyses of the results of these varietal trials were made. The Station is very liable to flooding after heavy rains, and difficulties over water control make it impossible to obtain consistent results in experiment work. It has been decided to abandon this Test Station.

It is worthy of record, however, that during the past four or five seasons Radins 13 and 11, Mayang Ebos 208, 88 and 210 have usually given better crops than other varieties. Seraups 36 and 68 have been more satisfactory than other Seraups. The highest yields which have been obtained are over 4,500 lbs. (840 gantangs) per acre from Radin varieties in 1934-35 season and 4,430 lbs. (810 gantangs) per acre from Seraup 36 in 1932-33 season.

Bruas Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	
	Square A	Square B
Seraup 371 ...	17.4	21.6
„ 146 ...	19.2	18.2
„ 36 ...	17.9	18.7
„ 48 ...	17.7	16.5
	S.D. 2.7	S.D. 3.9
	No significant differences.	

Yields were better than in the previous season, but growth of certain strains was irregular and poor. Seraup strains and Siam 29 seem to be best able to withstand the unfavourable soil conditions.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Siam 29 ...	18.0	Radin 11 ...	14.3
Siam 76 ...	13.1	„ 13 ...	13.4
Radin 13 ...	14.2	„ 1 ...	10.3
Radin 11 ...	14.1	Reyong 20 ...	9.8

Siam 29 significantly better than other varieties in these two squares.

Sungei Manik Test Station.

This Test Plot was commenced for the season 1935-36 in the Sungei Manik district where an area of over 20,000 acres is being developed as irrigated padi land.

Latin Square trials were laid down this season but yields were not good largely due to rat damage; Radin 13 and Seraup 371 however, showed promise.

SELANGOR.

Yields from varietal trials at all five Test Stations in Selangor have been so variable in the past that no such trials were put down this season.

At Kajang, floods are so usual, and damage by rats and insect pests has been so severe that it is considered that selection of the most suitable variety is neither feasible nor the immediate problem.

At Kuang, the Test Station is situated on a comparatively recently developed portion of the padi land, and over most of the Station padi plants are affected in much the same way as at Bruas by unsuitable soil conditions. On this portion, too, stumps and timbers make it rather difficult to employ a plough for more thorough cultivation.

A local variety of padi, Banjar Rendah, and a selected strain, Siam 29, gave satisfactory crops.

The other three Stations, at Tanjong Karang, Panchang Bedena and Sungei Haji Durani, are in the Kuala Selangor District, between the Selangor and the Bernam Rivers, where an extensive area of swamp jungle has been opened up recently for padi cultivation. As is usual in the circumstances, rat damage is severe; supply and control of water also present difficulties, and varietal trials cannot be expected to give reliable results. For the time being, observation plots, only, of certain strains of Radin, Nachin, Siam, Mayang Ebos, Reyong, Seraup and other varieties are being planted.

NEGRI SEMBILAN.

Kendong Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 15 ...	12.8	Siam 29 ...	14.7
„ 36 ...	12.4	Serendah Kuning ...	13.4
„ 48 ...	11.1	Radin 2 ...	10.7
Radin 13 ...	12.0	Nachin 66 ...	10.7
S.D. 1.2 No significant differences.		S.D. 1.1 M.S.D. 1.9 lbs.	

Milek Kuning 3 ...	18.0	Radin Siak 34 ...	13.0
Reyong 20 ...	13.7	„ „ 18 ...	11.9
F.S. 875 ...	10.2	„ „ 17 ...	11.8
F.S. 28 ...	9.7	„ „ 24 ...	10.2
S.D. 2.0 M.S.D. 2.9 lbs.		S.D. 1.4 M.S.D. 2.1 lbs.	

Alterations in planting dates (mostly earlier) were made for this season, and yields, though still poor, are better than in the 1935-36 season. Milek Kuning 3, the highest yielder last season with nearly 1,500 lbs per acre (280 gantangs), was, with 2,160 lbs per acre (400 gantangs), much the best this season, also.

Ampang Tinggi Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	
Radin 11 ...	16.6	Results of no value. Relative planting dates abnormal.
„ 13 ...	10.2	
„ 2 ...	3.2	
Serendah Kuning ...	9.6	

Variety	Mean Yield per 1/120th acre in lbs.	
Siam 29 ...	20.8	By inspection no significant differences.
Raja Bersanding ...	20.2	
Milek Kuning 3 ...	20.1	(Average of 3 plots)
Nachin 11 ...	20.1	Sown too early and one plot severely attacked by birds.

Radin Siak 34 ...	19.7	S.D. 0.63 M.S.D. 1.1 lbs.
„ „ 7 ...	17.6	
„ „ 18 ...	17.3	
„ „ 17 ...	16.3	

Reyong 20 ...	22.5	No analysis.
Mayang Ebos 203 ...	17.6	
Milek Puteh 9 ...	9.8	Sown too early and crop severely damaged by birds.
F.S. 875 ...	4.7	

This is the second season for this Test Station and planting dates are still not satisfactory. Reyong 20 has given the highest yields both seasons, and the local Raja Bersanding is as good as any of the introduced selections, and selection of this variety should be worth while.

Ulu Klawang Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 15 ...	14.6	Radin 16 ...	15.2
„ 36 ...	14.3	„ 13 ...	14.1
„ 48 ...	13.0	„ 11 ...	12.3
„ 146 ...	13.0	„ 4 ...	14.3
S.D. 1.8 No significant differences.		S.D. 4.1 No significant differences.	

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Mayang Ebos 80 ...	8.9	Siam 29 ...	27.9
„ „ 203 ...	12.1	Milek Kuning 3 ...	19.3
„ „ 202 ...	12.2	Radin 4 ...	20.7
„ „ 209 ...	15.8	Mayang Ebos 203 ...	19.5
Yields too irregular. No analysis.		S.D. 3.8 M.S.D. 6.6 lbs.	

Siam 29 ...	14.6*	*Average of 3 plots 18.4 lbs. (Fourth plot almost no crop on account of stem borers.)
Nachin 66 ...	16.3	
Reyong 20 ...	17.6	S.D. 6.7
Serendah Kuning ...	17.8	No significant differences

For this season, planting dates were about a month later than for 1935-36 season and yields are much higher. Siam 29 has given a very good yield on the better soil of Square E. In Square D one of the Siam 29 plots was seriously affected by stem borer attack. Reyong 20 and the local Serendah Kuning are good in Square D.

PAHANG.

Kerdau Test Station, Temerloh.

The old Test Station at Temerloh was abandoned at the end of last season on account of the excessive variation in depth of the land in the *paya**, and the liability to flooding in December.

The new Test Station was commenced at Kerdau this season.

The levels of the *paya*, in which this new Test Station is situated are variable, but not to such an extent as in the old one. Milek Kuning shows considerable promise. Reyong 20 and Siam 29 are also good.

* *Paya* = small valley with marsh land.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Milek Kuning 3 ...	27.0	Reyong 20 ...	24.6
Siam 29 ...	17.0	Siam 29 ...	23.2
Nachin 66 ...	17.9	Milek Puteh 4 ...	20.9
Radin 13 ...	16.6	Mayang Ebos 203 ...	13.0
Seri Ayer ...	17.4		
(Duplicate squares combined) S.D. 4.6 M.S.D. 4.3 lbs.		(Duplicate squares combined) S.D. 4.8 M.S.D. 5.3 lbs.	

F.S. 875 ...	18.8	(Duplicate squares combined)
Nachin 756 ...	7.5	Planted too early, and ripe grains eaten by birds.
Radin Siak 34 ...	3.0	
Radin Siak 24 ...	2.0	

Dong Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Milek Kuning 3 ...	12.0	Milek Kuning 3 ...	15.1
Nachin 11 ...	13.4	Siam 29 ...	13.4
Siam 29 ...	13.6	Milek Puteh 148 ...	11.6
Reyong 20 ...	9.1*	„ „ 11 ...	8.4
Milek Kuning 2 ...	7.9	„ „ 9 ...	8.5
S.D. 1.7 M.S.D. 2.5 lbs. * (3 months between flowering and harvest. Unsuitable date of sowing).		S.D. 2.1 M.S.D. 3.0 lbs.	

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th. acre in lbs.
Radin China 4 ...	13.9	Milek Kuning 3 ...	18.0
Radin Siak 17 ...	12.1	Serendah Kuning ...	10.7
„ „ 24 ...	12.4	Seri Ayer ...	5.1
„ „ 34 ...	12.1	Jarom Mas ...	13.1
S.D. 0.9 M.S.D. 1.6 lbs.		Irregular dates for sowing and harvest. No analysis.	

Siam 29 ...	15.1	
Mayang Ebos 203 ...	10.8‡	‡ (Over 3 months between flowering and harvest).
„ „ 80 ...	15.2	No analysis.
„ „ 88 ...	13.0	

Yields are poor and in some cases the most suitable dates for sowing have not yet been found. Milek Puteh strains and Milek Kuning 2 do not seem to be of much promise nor worth further trial here.

Lipis Test Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Milek Kuning 3 ...	17.6	Siam 29 ...	15.9
Milek Kuning 2 ...	13.2	Milek Puteh 148 ...	16.1
Seraup 36 ...	10.7	„ „ 9 ...	16.1
Radin 13 ...	13.9	„ „ 7 ...	12.7
S.D. 1.26 M.S.D. 2.2 lbs.		Milek Puteh 7 significantly poorer than other varieties.	

The value of results from other Latin Squares was greatly reduced by irregularity in times of ripening and poor yields. Here, also, the most suitable dates for sowing had not yet been determined for many of the varieties. Milek

Kuning 3 has again given satisfactory returns, as it has done in most of the Pahang Stations. The highest yield was obtained from Siam 29 in Square E with 19.2 lbs per 1/120th acre.

Bawang Test Station.

This Plot was opened for the first time for season 1935-36. Except for Milek Kuning 3 and Radin Siak strains which were fairly satisfactory in one of the better parts of the Plot, yields are still too low to be of any value. The season was a very protracted one, lasting from March to February, and a suitable season and dates for sowing have yet to be decided upon. This problem now resolves itself into the alternative of sowing long term varieties for an August—February season or short term varieties for a March—July season.

Sungei Blat Test Station.

Variety	Mean Yield per 1/120th acre in lbs.	
Siam 29 ...	12.3	
Nachin 66 ...	13.2	(Triplicate squares combined) S.D. 2.5
Milek Puteh 11 ...	9.8	M.S.D. 2.0 lbs.
Milek Puteh local ...	8.6	

Six other varieties and strains were tried in Latin Squares but results were poor and are not reproduced. Much difficulty was encountered with regard to water supply. The land was dry and without water during preparation in June and July; very little was available at commencement of transplanting in September, and then when the heavy rains commenced in October the Station was flooded to a depth of two feet.

The rest of the season was good, except that there was water on the land until after harvest, probably accounting for the abnormally prolonged interval between flowering and full ripeness of the grain.

In spite of these difficulties Siam 29 and Nachin 66 both gave very good yields for the district.

Pekan Test Station.

This is another but older Station on the Pahang coast, where control of too much water is the chief difficulty. Rainfall this season was exceptionally heavy, the total for the months of October, November and December being 86.06 inches, and it has been decided to abandon it in favour of a site at Pahang Tua where conditions are better.

MALACCA.

Pulau Gadong Padi Experiment Station.

The end of August and all September were rather dry and some trouble was experienced in maintaining supplies of irrigation water on the higher portion of the land. Flooding occurred in October and November which did a little damage to padi. Weather conditions at harvest were ideal.

Selection Work.—The selection programme was a large one, seven varieties being retained from the 1935-36 season and three new introductions were sent in from Pahang.

The varieties under selection are as follows:—

Third year.	Ear-to-row selection.	Serendah—Malacca.
Second year.	,, ,,	Gandar—Pahang.
,, ,,	,, ,,	Seri Menjadi—Pahang.
First year.	,, ,,	Seri Ayer—Pahang.
,, ,,	,, ,,	Milek Puteh—Pahang.
,, ,,	,, ,,	Terong Papan—Pahang.
Second year.	,, ,,	Serendah Puteh—Negri Sembilan.
,, ,,	,, ,,	Serendah Kuning—N. Sembilan.
,, ,,	,, ,,	Serendah Salleh—N. Sembilan.
,, ,,	,, ,,	Antar Bras—Negri Sembilan.

The local Serendah in the third year of ear-to-row selection produced nothing outstanding. Tillering was fair only, but all ears were well filled. Straw strength was good and growth even in all cases. Ripening was very even.

Seri Ayer seems to be the best of the Pahang varieties. Seventeen lines were planted but reduced to ten for next season for reasons of poor straw and heterozygous characters. The maturation period in Malacca is 223 days compared with an average of 265 in Pahang. For the second season, seed from ten plants, representing the whole range of yields, will be sown at Titi Serong in Krian, and Temerloh in Pahang, as well as at Pulau Gadong.

Serendah Kuning is the most promising of the four Negri Sembilan varieties. Maturation periods were 225 and 245 days.

Further selection work was done on the local Siam variety. One hundred and five strains from 21 different localities were planted, the primary object being to select for straw strength for use in breeding work. Ten strains only, with strong erect straw or robust habit of growth, have been retained for next season.

Five pure lines of Radin Siak were grown again this season, and the same strains were planted in a Latin Square trial.

Some rat damage occurred, R.S. 25 being most affected. There was a tendency to lodge, except with R.S. 24 which appeared to have stronger straw. In the pure lines R.S. 17 was the best. There seems to be very little to choose between R.S. strains Nos. 7, 17, 18, 24, 34 and 69 apart from local or seasonal variations in yields. R.S. 25 is consistently the least satisfactory of the present remaining seven selected strains.

Variety	Mean Yield per 1/120th acre in lbs.
R.S. 24 ...	18.6
„ 17 ...	15.3
„ 69 ...	16.4
„ 34 ...	16.1
„ 25 ...	12.8
S.D. 1.4 M.S.D. 2.0 lbs.	

JOHORE.

Tangkak Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Radin Siak 17 ...	16.4	Siam 29 ...	32.4
„ „ 24 ...	12.1	Siam 76 ...	24.6
„ „ 34 ...	14.7	Mayang Ebos 203 ...	15.9
Lembut Tembiling ...	5.3	Serendah Kuning ...	15.3
S.D. 1.4. M.S.D. 2.4 lbs.		S.D. 2.4 M.S.D. 4.2 lbs.	

Siam 29 ...	31.1	Nachin 11 ...	28.0
Siam 76 ...	27.0	Nachin 66 ...	27.6
Nachin 11 ...	22.9	Radin 2 ...	19.5
Nachin 66 ...	20.0	Radin 7 ...	11.7
Lembut Tembiling ...	2.9	Serendah Kuning ...	17.6
S.D. 3.3 M.S.D. 4.8 lbs.		S.D. 1.8 M.S.D. 2.7 lbs.	

This is the second season of the Station and the first in which Latin Square trials were made. Some unidentified pest, apparently specific in its attack, did very considerable damage to Radin 7 and Lembut Tembiling in the Latin Squares and to Milek Puteh 148 and Milek Kuning 3 in other plots. Radin 7 suffered similarly last season in observation plots.

Radin Siak would appear to be not as suitable a variety as either Siam or Nachin. Siam 29 has given very satisfactory crops in the two Latin Squares in which it was tried.

Jementah Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Lembut Tembiling ...	20.7	Lembut Tembiling ...	14.2
Nachin 66 ...	14.3	Siam 29 ...	13.5
Mayang Ebos 203 ...	13.7	Mayang Ebos 203 ...	13.1
Radin 7 ...	9.6	Nachin 66 ...	10.4
S.D. 4.8 M.S.D. 8.4 lbs.		S.D. 4.1 M.S.D. 7.1 lbs.	

Lembut Tembiling ...	25.6	Lembut Tembiling ...	17.5
Siam 76 ...	22.5	Nachin Puteh ...	17.5
Radin 2 ...	20.1	Serendah Kuning ...	18.8
Nachin 11 ...	18.5	Serendah Puteh ...	19.2
S.D. 1.6 M.S.D. 2.7 lbs.		By inspection, no significant differences.	

Lembut Tembiling ...	26.4*	* (Average of 3 plots)
Radin Siak 17 ...	17.7	1 plot almost destroyed by rats.
„ „ 24 ...	18.8	Lembut Tembiling obviously best.
„ „ 34 ...	17.1	

Lembut Tembiling, the most popular local variety, has given very satisfactory returns and is significantly better than all the introduced selected strains except Siam 29, Nachin 66 and Mayang Ebos 203. It would seem well worth while selecting strains of local varieties.

Tenglu Test Station.

Extensive damage was done by *Scotinophora coarctata* and varietal trials were rendered valueless.

In observation plots better yields were obtained from Seraup 371, Nachin 66, Siam 76, Radin China 17, Seraup 48 and the local variety Lantik.

KELANTAN.

Kota Bahru Experiment Station.

Variety	Mean Yield per 1/120th acre in lbs.	Variety	Mean Yield per 1/120th acre in lbs.
Siam 29 ...	25.5	Seraup 15 ...	25.5
Siam 76 ...	22.7	„ 36 ...	24.3
Nachin 66 ...	24.0	„ 48 ...	23.6
Nachin 27 ...	17.2	Radin 4 ...	22.1
Radin 13 ...	16.6	Radin 2 ...	19.0
Radin 2 ...	14.7	Mayang Ebos 203 ...	17.5
S.D. 1.5 M.S.D. 1.9 lbs.		S.D. 1.7 M.S.D. 2.2 lbs.	

Radin Siak 24 ...	22.1	Padang Trengganu 2	24.3
„ „ 7 ...	18.9	„ „ 4	22.6
„ „ 17 ...	17.1	„ „ 5	23.4
„ „ 18 ...	16.0	„ (unselected)	23.8
S.D. 1.3 M.S.D. 2.2 lbs.		By inspection, no significant differences.	

Maturation periods for Square A are between 170 and 180 days from sowing to harvest, for Square B from 180 to 195 days, for Square C 167 days, and for Square D 213 days. It is notable that, in particular, the Seraup strains from

Krian with a normal maturation period there of 8 months ripen in a much shorter length of time at Kota Bahru.

Yields are good, the local variety Padang Trengganu being as good as any other. This local variety lodged badly, however, as did also Radin Siak (except R.S. 18), Siam 29 and Nachin 66.

Seraups 15 and 36 have been the most reliable and satisfactory strains over the past two seasons.

Selection work on Padang Trengganu has not yet been completed and is being extended; other varieties are dealt with, too. The most important of these are Anak Naga and Singgora, the first of which is widely grown throughout Kelantan, and the second is said to have been introduced from Siam after the serious December 1926 floods. Both these are medium term varieties with maturation periods of $6\frac{1}{2}$ to 7 months from sowing. The most important long term varieties with maturation periods of $7\frac{1}{2}$ months, are Mayang Sa Gumpal from Kota Bahru and Pasir Mas districts and Nalong from Pasir Puteh district.

Dry Padi Experiments.

Variety	Mean Yield per 1/80th acre in lbs.	Variety	Mean Yield per 1/80th acre in lbs.
Jintan Koreng ...	12.3	Jintan Koreng ...	12.0
Sa Bumi Puteh ...	10.5	Kaki Merpati 3 ...	10.2
Kaki Merpati ...	9.8	„ „ 5 ...	13.2
Anak Lebah ...	8.5	„ „ 19 ...	11.0
Padang Serai ...	10.1	„ „ 21 ...	13.0
Jintan Manis ...	12.3	Padang Serai 13 ...	10.8
S.D. 1.3 M.S.D. 1.7 lbs.		S.D. 1.3 M.S.D. 1.7 lbs.	

Dry padi cultivation is much more extensive in Kelantan than elsewhere in Malaya. Yields are usually less than for wet padi cultivation.

Selection work has just been commenced on above varieties, the best of which are, perhaps, Jintan Koreng, Sa Bumi Puteh, and Kaki Merpati.

Pasir Puteh Test Station.

Four Latin Squares were laid down for varietal trials but rat damage was so extensive that results could not be considered as of any comparative value. Siam 29, Nachin 66, and Padang Trengganu plots lodged more or less badly.

Yields of over 300 gantangs per acre were obtained from Siam 29, Nachin 66, Padang Trengganu, Nalong, Manek Siam, Serendah, and Chantek. Anak Naga plots suffered rat damage to the extent of 70 to 90 per cent.

Bachok Test Station.

This Station was purchased in 1935 and utilized for the first time this season. The soil is of a very sandy nature, and water supply is unassisted rainfall.

Three Latin Squares for wet padi varietal trials were laid down including introduced selected strains of Siam and Radin and five local varieties, and one Latin Square of four local dry padi varieties.

The yields of the wet padi varieties in this poor soil were very low for this form of padi cultivation, the average yield being 7.4 lbs. per 1/120th acre or about 170 gantangs per acre, and very little better than the yields of the varieties in the dry padi varietal trial, below:—

Variety	Mean Yield per 1/80th acre in lbs.
Sa Bumi Puteh ...	10.5
Kaki Merpati ...	10.6
Padang Serai ...	10.1
Anak Lebah ...	9.4

S.D. 1.6
No significant differences.

BRUNEI AND LABUAN.

Test Stations have been opened in Brunei, at Kilanas in 1934, and at Lumapas, Kuala Abang, Temburong and Berakas in 1935.

Varietal trials were laid down at Kilanas, Lumapas, and Kuala Abang, but at this stage of the establishment of padi experimental work and with the prevalence of rat damage, statistical analysis is hardly likely to give any useful information.

It is apparent, however, that, at Kilanas, Siam 29 and Seraups have done best; at Lumapas, where the deepest soil and the highest yields were found, Seraups and the local padi Jongkok were best; and at Kuala Abang Siam 29, Reyong 20 and Radin 2 show up well amongst selections which were tried.

Selection work on local varieties has already been commenced at Kilanas, and 62 ear-to-row lines of Jongkok, 68 lines of Radin Pasir, 22 lines of Arat and 24 lines of Padi Langsat have been selected for further observation.

The local variety Jongkok did not do well at Kilanas this season, but was very good in the 1935-36 season, and it seems to be worth while selecting from for Kilanas and Lumapas Districts. An earlier maturing variety will probably be more suitable for Kuala Abang.

Labi and Temburong Districts are not within easy reach of headquarters at Brunei town. No agricultural subordinate officers are, as yet, stationed there, and only preliminary work in the encouragement of padi cultivation is being attempted. Labi is a good agricultural area and Temburong has a limited area of wet padi land, but is irregularly cultivated. At Berakas it is hoped to foster wet padi in place of desultory dry padi cultivation.

One Test Station has been established in Labuan. Preliminary trials consisted of comparative examination of 65 ear-to-row lines of local padi Siam with Siam 29 as standard, 47 lines of padi Pasir with Milek Puteh 148 as standard and 35 lines of padi Acheh with Seraup 15 as standard.

Twenty-five lines of Siam, eight of Pasir, and sixteen of Acheh have been retained.

Similar selection work was commenced with another local variety "Rangoon". Five hundred plants were grown and ears from forty-four of these were kept as seed.

Damage was done by wild pig, rats and stem-borers.

Summary.

The 1936-37 padi season throughout Malaya for several different reasons has not been a particularly successful one, but satisfactory progress has been made with experiment work, especially in regard to extension of work on selection of local varieties of padi in Kedah, Krian, Negri Sembilan, Pahang and Kelantan.

Kedah and Province Wellesley (North).

The position remains unchanged; selected strains of Reyong, Mayang Ebos, Radin China, Siam and Nachin varieties give very satisfactory returns in different localities.

Selection work is being continued on a few more of the local varieties.

An exceptional feature of the padi season in Kedah was the severity and extent of infection by *Sclerotium oryzae*, encouraged by abnormal rains early in the season.

Krian and Province Wellesley (South).

Seraup 48 has not done as well as Seraups 371 and 146 in Latin Square trials but maintains its popularity with the padi planters on account of its yields and sturdy habit in the field.

Progress is being made with extension of selection work on more local varieties of padi throughout the Krian District.

Kuala Kangsar District, Perak.

Mayang Ebos, Radin, Seraup and Siam strains have given varyingly successful crops.

Pahang.

Many of the padi growing areas are not favoured with easy control of water supplies but the problem of determining the most suitable dates for sowing is making progress.

Milek Kuning 3 was outstanding in its reliability to give a comparatively satisfactory crop.

Selection of Seri Ayer and other local varieties is being done locally and at the Pulau Gadong Experiment Station, Malacca.

Negri Sembilan.

Progress has been made in ascertaining the most suitable dates for sowing various selected strains.

Siam 29 and Reyong 20 gave good yields in particular localities.

Malacca.

The position remains unchanged, Siam 29 being the most popularly grown strain of padi.

Selection work on varieties of padi from Negri Sembilan and Pahang is being carried out at the Pulau Gadong Experiment Station.

Kelantan.

Selected strains of Seraup, Siam and Nachin varieties have done well.

Selection work on Anak Naga, Padang Trengganu and other local varieties of good types is being continued.

Received for publication 18th November, 1937.

PADI MANURIAL AND MINOR CULTURAL TRIALS 1936 - 1937

Compiled by
R. G. H. Wilshaw,
Chemist (Soils).

The programme of manurial trials for the 1936-37 season consisted in the main of four standardized experiments repeated on various Stations throughout the Peninsula; also, as in former years, some Stations laid down a number of other experiments of a minor nature in connexion with cultivation practices.

A description of the design, treatments and lay-out of three of the four main experiments is given under "Padi Manurial and Minor Cultural Trials 1935-1936",* where they are referred to as Normal Phosphate, Heavy Rock Phosphate Dust and Heavy Superphosphate Trials.

This season the Normal Phosphate experiment was repeated on selected Stations, and initiated in Kedah and Kelantan.

The Heavy Superphosphate and Rock Phosphate Dust trials were replanted only for examination of residual effects.

The fourth main experiment, referred to as the Insoluble Nitrogen and Phosphate Trial, was a new experiment designed to test out under field conditions the results obtained in pot experiments with a slowly decomposing nitrogenous fertilizer such as ground horn.† The results of these pot experiments were published in this Journal in 1936.

The lay-out of the Insoluble Nitrogen and Phosphate Trials was as follows:—

O	N	2N	2N	N	O
O	P	2P	P	O	2P
P	2P	O	O	2P	P
2P	O	P	2P	P	O
P	2P	O	2P	O	P
O	P	2P	P	2P	O
2P	O	P	O	P	2P
2N	O	N	2N	O	N

* *Malayan Agricultural Journal* Vol. XXIV p. 618 December, 1936.
† *Malayan Agricultural Journal* Vol. XXIV p. 323 *et seq.* July, 1936.

N represents a nitrogen dressing of ground horn (12 per cent. nitrogen) equivalent to 11 cwts. per acre.

2N represents 22 cwts. per acre ground horn.

P represents a phosphatic dressing of rock phosphate dust equivalent to 2 cwts. per acre.

2P represents 5 cwts. per acre rock phosphate dust.

O represents control.

Unit plots 1/360th acre, all main plots (three unit plots) separated by guard rows.

Normal Phosphatic Trials.

The results of these trials carried out on the various Stations are given in Table I.

Table I.
Normal Phosphatic Trials.
Mean yields in lbs. per 1/120th acre.

Station.	Proprietary Brand.	Rock Dust.	Super.	Control.
Telok Chengai ...	20.0	19.2	21.1	19.0
C. E. S. Kelantan ...	25.4	26.2	26.3	26.3
Bachok ...	16.2	16.7	13.9	10.8
Briah ...	19.8	21.8	21.7	20.2
Sungei Kapar ...	20.4	18.8	19.3	18.7
Talang ...	28.3	27.2	26.9	25.2
Pulau Gadong ...	22.5	21.9	21.1	18.0

Table II.
Normal Phosphate Trials.
Bachok.

Treatment.	Yield in lbs. per 1/120th acre.	
Proprietary brand ...	16.25	S.D.* = 1.82 lbs. = 12.6% of general mean.
Rock phosphate dust ...	16.75	M.S.D. = 3.16 lbs.
Superphosphate ...	13.90	I.C. = 2.5 lbs.
Control ...	10.81	
Mean	14.4	

* S.D. = Standard Deviation.
M.S.D.= Minimum Significant Difference.
I.C. = Increase over control plot necessary to attain significance.

Statistical analysis of the yield figures shows that significant increases over the control by a manurial treatment were obtained only at Bachok and Pulau Gadong, full analyses for which are given in Table II.

Pulau Gadong.

Proprietary brand ...	22.5	S.D. = 0.9 lbs. = 4.3% of general mean.
Rock phosphate dust ...	21.9	M.S.D. = 1.56 lbs.
Superphosphate ...	21.1	I.C. = 1.23 lbs.
Control ...	18.0	
Mean	20.9	

Heavy Rock Phosphate Dust and Heavy Superphosphate Trials—Residual Effects.

The residual effects of these trials are given in Tables III and IV.

Table III.
Heavy Rock Phosphate Dust Trials - Residual Effects
Mean yield in lbs. per 1/360th acre.

Station	Control.	16 cwts.	32 cwts.	48 cwts.
Telok Chengai ...	8.5	8.8	8.1	9.4
Bukit Merah ...	7.7	8.8	8.3	8.8
Titi Serong ...	9.3	9.2	9.3	9.3
Selinsing ...	3.8	3.9	3.3	3.2
Briah ...	6.1	5.9	5.3	5.2
Sungei Kapar ...	6.6	4.5	6.2	6.8
Bagan Serai ...	5.8	6.1	6.2	5.8
Kuala Kurau ...	9.1	9.2	8.4	8.3
Talang ...	11.1	11.5	11.2	11.1
Kendong ...	6.1	5.4	5.4	5.2
Pulau Gadong ...	5.9	6.9	6.1	6.6
Bruas ...	2.5	2.3	1.9	2.7

Table IV.
Heavy Superphosphate Trials - Residual Effects.

Mean yield in lbs. per 1/360th acre.

Station	Control.	16 cwts.	32 cwts.	48 cwts.
Telok Chengai ...	8.2	8.6	8.6	8.7
Bukit Merah ...	7.7	9.6	9.8	8.7
Titi Serong ...	8.4	8.7	9.1	9.1
Selinsing ...	3.7	3.5	4.0	3.8
Briah ...	5.7	4.2	4.3	4.4
Sungei Kapar ...	5.9	6.0	6.2	5.8
Bagan Serai ...	5.6	5.0	5.3	6.2
Kuala Kurau ...	8.6	8.3	8.1	8.7
Talang ...	10.6	11.3	10.7	11.1
Kendong ...	4.7	3.6	3.8	4.2
Pulau Gadong ...	6.1	6.4	6.4	6.4
Bruas ...	3.1	2.4	3.0	2.2

Although in certain cases differences in the early stages of growth were reported between the different treatments, the residual effect of the phosphate dressings is negligible.

Significant differences have emerged only at Pulau Gadong with rock phosphate and at Bukit Merah with superphosphate. Considering the balance of evidence, however, the significance of these results should be regarded with suspicion.

Insoluble Nitrogen and Phosphate Trials.

The results of this experiment carried out on five Stations are given in Table V.

Table V.
Insoluble Nitrogen and Phosphatic Trials.

Mean yield in lbs. per 1/360th acre.

Telok Chengai.

Treatment.	No Phosphate.	2 cwts. Rock Phosphate.	5 cwts. Rock Phosphate.	Mean.
No nitrogen ...	7.34	7.31	7.25	7.30
11 cwts ground horn. ...	7.47	7.41	7.25	7.38
22 cwts. ground horn. ...	5.94	6.16	4.25	5.33
Mean	6.92	6.96	6.33	6.74

Titi Serong.

Treatment	No Phosphate.	2 cwts. Rock Phosphate.	5 cwts. Rock Phosphate.	Mean.
No nitrogen ...	7.78	7.90	8.37	8.02
11 cwts. ground horn ...	8.12	8.43	7.59	8.05
22 cwts. ground horn ...	7.81	7.18	8.00	7.66
Mean	7.90	7.84	7.99	7.91

Talang.

No nitrogen ...	8.87	9.62	9.00	9.16
11 cwts. ground horn ...	10.82	10.37	10.82	10.67
22 cwts. ground horn ...	10.27	10.40	10.47	10.38
Mean	9.95	10.13	10.10	10.06

Pulau Gadong.

No nitrogen ...	5.93	7.00	6.75	6.56
11 cwts. ground horn ...	7.19	7.94	7.25	7.46
22 cwts. ground horn ...	6.25	5.62	5.62	5.83
Mean	6.46	6.85	6.54	6.62

C. E. S. Kelantan.

No nitrogen ...	5.53	6.06	5.77	5.79
11 cwts. ground horn ...	5.01	5.48	5.11	5.30
22 cwts ground horn ...	4.38	4.36	4.62	4.45
Mean	4.97	5.30	5.27	5.18

It will be seen that the effect of the treatments is not very noticeable and although in the case of the Central Experiment Station, Kelantan, Pulau Gadong and Telok Chengai statistical analysis indicates significant effects due to the addition of nitrogen, these effects are in general deleterious rather than beneficial.

Minor Experiments.

In addition to the foregoing experiments, about thirty subsidiary experiments mainly in connexion with cultural operations were carried out in various districts.

Of these thirty experiments positive or important results were obtained only from about nine.

At Titi Serong the practice of *menarek* gave a significant increase in yield over the local practice.

Menarek consists of dragging from near the bunds to the centre of the padi-fields the rotted organic matter which accumulates wherever there are permanent vegetables bunds erected yearly at clearing time. The local practice is to omit this redistribution of the organic matter.

Table VI.
Cultivation Experiment, Titi Serong.

Treatment.	Mean Yield in lbs. per 1/10th acre.	
Menarek ...	327.5	S.D. = 10.4 lbs. = 3.4% of general mean.
Control ...	285.2	M.S.D. = 14.3 lbs.
Mean	306.3	

Table VII.
Cultivation and Manurial Experiment, Selinsing.

2nd year of Residual Effects

Mean Yield in lbs. per 1/80th acre.

Treatment.	Control.	P.	N.P.	Mean.
Changkol ...	20.0	21.3	19.9	20.4
Tajak ...	17.8	20.0	18.3	18.7
Mean	18.9	20.6	19.1	19.5

At Selinsing the cultivation and manurial experiment reported on previously* was replanted once more for observation of residual effects. The results are given in Table VII.

No significant differences emerge from the results this year. It may be recalled that this experiment was initiated in 1932-33, repeated for two further seasons, and finally replanted for two more seasons to examine the residual effects. Changkolling† has proved superior to tajaking‡ and appears to have a residual effect extending for one season.

At Pulau Gadong an experiment in connexion with the preparation of land before planting though not statistically significant is suggestive (Table VIII).

Table VIII.
Preparation of Land Experiment, Pulau Gadong.

Treatment.	Mean Yield in lbs. per 1/100th acre.	
Land prepared 4 weeks before planting	16.12	S.D. = 1.34 lbs. = 8.6% of general mean.
Land prepared 6 weeks before planting	15.81	
Land prepared 8 weeks before planting	14.69	M.S.D. = 2.3 lbs.
Mean	15.54	

In Kelantan a wide series of experiments was carried out on wet and dry padi, at the Central Station, Kota Bahru, at Pasir Puteh and at Bachok.

The results of six of these experiments are given in Tables IX to XIV.

Table IX.
Residual Effect of Bat Guano - Kota Bahru.

Treatment.		Mean Yield in lbs. per 1/60th acre.	
1 cwt. bat guano 1935-6	...	52.5	
2 „ „ „ „	...	46.5	
3 „ „ „ „	...	50.5	
Control—no manure	...	49.4	

* *Malayan Agricultural Journal* Vol. XXIV, p. 87, February, 1936, and Vol. XXIV, p. 628, December, 1936.

† Cultivation with a mattock or digging hoe, locally termed *chankol.*

‡ Scything weed growth with a local tool called a *tajak.*

It is apparent from inspection of these results that there are no residual effects of the bat guano.

Table X.

Wet Padi Manurial Experiment, Kota Bahru.

2nd Year Residual Effect.*

Treatment.	Mean Yield in lbs. per 1/40th acre.	
N.P.K. basic ...	59.4	S.D. = 5.2 lbs. = 8.9% of general mean.
Superphosphate ...	61.6	
Superphosphate and ammonium sulphate ...	59.3	M.S.D. = 6.7 lbs.
do. in repeated doses	57.1	
Basic slag and cyanamide ...	59.8	I.C. = 5.4 lbs.
Control — no manure ...	52.4	

In the second season after the application of manures residual effects are still being evidenced.

Table XI.

Dry Padi Cultivation Experiment, Kota Bahru.

Treatment.	Mean Yield in lbs. per 1/80th acre.	
Changkol early ...	13.5	S.D. = 1.45 lbs. = 11.5% of general mean.
Changkol late ...	11.7	
Plough and harrow ...	9.6	M.S.D. = 2.1 lbs.
Changkol late ...	14.2	
Changkol early ...	13.6	
Mean	12.5	

Changkolling has given significant increases over ploughing and harrowing.

* *Malayan Agricultural Journal* Vol. XXIV. No. 12, p. 26. December, 1936.

Table XII.
Wet Padi Cultivation Experiment, Kota Bahru.

Treatment 1935	Treatment 1936.	Mean Yield in lbs. per 1/60th acre.	
Changkol late	Plough and harrow	47.4	S.D. = 5.2 lbs. = 11.8% of general mean.
Plough and harrow	Plough and harrow	41.6	
Plough and harrow	Changkol early ...	41.7	
Plough and harrow	Changkol late ...	45.4	

Table XIII.
Wet Padi Manurial Experiment, Pasir Puteh. Residual Effects.*

Treatment 1935-36.	Mean Yield in lbs. per 1/40th acre.	
1 cwt. bat guano ...	31.7	S.D. = 5.8 lbs. = 18.0% of general mean.
2 cwts. „ „ ...	33.5	M.S.D. = 7.5 lbs.
3 „ „ „ ...	35.5	I.C. = 6.05 lbs.
Cow dung 5 tons ...	33.9	
Green manure 5 tons 1934—5 ...	29.3	
Changkol 1 ft. ...	28.8	
4 cwts. bat guano 1934—5 ...	29.5	
Control—no manure ...	27.1	
Mean	32.2	

From the statistical analysis it may be taken that the heavier dressings of bat guano have had a residual effect.

Table XIV.
Rock Phosphate Manurial Experiment, Bachok.

Treatment.	Mean Yield in lbs. per 1/60th acre.	
Rock phosphate ½ cwt. p.a.	15.5	S.D. = 2.4 lbs. = 15% of general mean.
„ „ 1 cwt. ...	14.9	M.S.D. 4.2 lbs.
„ „ 1 cwt. ...	19.9	I.C. 3.3 lbs.
Control—no manure ...	13.4	
Mean	15.9	

* *Malayan Agricultural Journal.* Vol. XXIV, p. 627, No. 12 December, 1936.

The heaviest phosphate dressing has had a significant effect over all other treatments.

In addition to the foregoing experiments and as a result of increases obtained in certain districts by the use of ground rock phosphate dust on Padi Test Stations in the previous season, a small field experiment was carried out in the Districts of Bagan Serai, Titi Serong, Selinsing and Bukit Merah. This experiment was carried out on plots of land belonging to local cultivators and consisted of a control area and an area treated with rock phosphate dust at the rate of 1 cwt. per acre.

Briefly summarized the results of twenty-seven such experiments indicated that although in many instances the phosphate dressing gave a small increased yield of padi, only in a very few particular cases was the increase economic.

Summary.

The general position in regard to padi manural trials carried out since 1930 was briefly summarized last year in this Journal*. Results obtained this season have supplied no further information. Trials with an insoluble form of nitrogen, which had given promising results in pot experiments, were most disappointing, and no residual effects have been obtained from the heavy dressings of phosphate applied in the 1935-36 season.

For next season, trials are being laid down to test the effect of repeated small doses of nitrogen, superimposed on former heavy phosphate dressing, and the effect of heavy green dressings in combination with phosphatic fertilizers.

* *Malayan Agricultural Journal*, Vol. XXIV. p. 629, December, 1936.

Review.

The Practical Aspects of Copra Deterioration.

By F. C. Cooke. Special Bulletin, General Series No. 28, Department of Agriculture, Straits Settlements and Federated Malay States. 1937. 49 pp. 3 plates. Price 50 cents (Straits currency) or 1s. 2d., post free.

In this paper Mr. Cooke has dealt with all the practical aspects of quality in copra. The entomological and mycological aspects of the same subject have been dealt with in Special Bulletin, Scientific Series, No. 20 of the Department of Agriculture, S.S. and F.M.S.

There is no real reason why bad copra should be produced anywhere in the world for, apart from very slight differences in oil content in the nuts of different countries, the quality of the meat is the same in all ripe coconuts from healthy palms all over the world. Differences in quality are due only to differences in care in the preparation of the copra and its subsequent handling, and it calls for no great amount of care, no high technical knowledge and no great expense, to prepare very good copra. For years the Departments of Agriculture of all copra-producing countries have been trying to educate local producers to prepare good copra, and to induce local traders to encourage its production. Yet even to-day the general standard of quality of the world's copra is appallingly low in comparison with the standards of every other primary agricultural produce that enters into world trade.

Undoubtedly one factor that contributes to this is the fact, explained by Mr. Cooke (pp. 26 and 27) that as copra deteriorates, while its oil becomes more acid, while moulds destroy its substance, it unfortunately happens that simultaneously the oil content of the remainder rises. Thus, though deterioration involves loss of weight and loss of quality in the oil and in the cake, yet no decrease—even a slight increase—occurs in the first figure the buyer looks at—the oil content of the sample.

This fact, however, does not entirely explain the present unsatisfactory condition of the world's copra, for despite this fact, the miller of copra is prepared to pay more for good copra than for bad. The higher value of the good oil and cake that he can make from good copra outweighs the greater proportion of oil that he can get from bad copra. The reason why the amount of deterioration that occurs in copra is so great as compared with that in other comparable products, such, for instance, as palm oil, palm kernels, or cocoa, seems to lie in the system by which it is handled on the world's markets.

If one ships palm kernels, palm oil or cocoa from West Africa to Liverpool, New York, Hamburg or London, one sells on definite well-known clauses which specify the grades of quality with considerable accuracy and which are substantially the same in all these markets. In the case of the two former products, not only can one thus sell on a clause closely defining the quality of the produce, but the

contract also provides for the payment of premia, or deductions of allowance, according to the variation of the parcel from the standard quality specified in the clause. In the case of cocoa, the system of futures, spot markets, and defined grades provides more elaborate machinery serving the same purpose of combining the advantages of forward sale or purchase with a final adjustment of price with very great exactitude according to the exact quality.

For copra we have simply the two grades of f.m.s. and fair merchantable, and the forward sale of these grades as such. Compared to the grade definitions in other products the meaning of these copra terms is extremely vague. They really amount to little more than "Fair Average Quality for the country concerned" and a quality distinctly lower than F.A.Q. but still recognisable as copra. This vaguenes of definition of grades and the inabilty to buy or sell a standard grade forward with subsequent accurate adjustment of the spot price according to the quality delivered militate to discourage the buyer in the country of origin from paying more for superior quality. Until he does so, efforts to induce the producer to prepare a better quality naturally meet with little response.

This situation also renders almost impossible the introduction of any satisfactory system of official grading at source, such as has been introduced in recent years in respect of nearly every other important primary agricultural product that is marketed wholesale.

The special contracts made by some estates for regular sale of "estate quality copra" are not a contradiction of the statements made above; for, though in such sales the buyer may get the exact quality he wants, and the seller get the extra price his quality deserves, both have to sacrifice the great advantage of trading in the open market. In any event this only affects estates, not the small-holders who produce a large proportion of the world's copra.

The considerations set out above are not theoretical ones. Let any one who is interested in the matter ask, for instance, Messrs. Cadburys or Messrs. Rowntrees if they would like to buy cocoa under the same conditions as copra is bought; and further ask them if they think that the quality of cocoa from West Africa would be what it is to-day if there were not accurate definitions in the standard clauses defining grades of cocoa.

Mr. Cooke discusses the range of quality of copra and the conditions under which it is marketed. He continues with a concise statement of the causes of deterioration and of the methods by which such deterioration may be obviated and concludes with a section on copra grading. The technique of preparation of copra must vary to suit local conditions, especially that of climate; but his recommendations are of a general character and simple to follow, so that there appears no good reason why the results of his investigation may not be translated into practice by producers at no great expense and to the ultimate benefit of the industry.

O. T. F.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

November, 1937.

The Weather.

Normal wet weather prevailed throughout the country except in Kelantan and a coastal strip in Selangor, but in general, precipitation was greater at the beginning and end of the month, with a much lighter rainfall in the middle of the month.

In Kelantan the rainfall was both uneven and considerably below normal.

Over the coastal strip of country from Sabak Bernam to Klang the rainfall was very much lighter than usual for November, only 3.31 and 4.06 inches being recorded at Sabak Bernam and Panchang Bedena respectively up to the 24th of the month.

Remarks on Crops.

Rubber.—The price for smoked sheet declined appreciably, quotations ranging from about $25 to $29 per picul as compared with from about $30 to $36 during the first three weeks of October, the decline in price having commenced in the last week of October.

Quotations for coupons show considerable variation in different parts of the country, but there was generally an increase in the prices offered, the highest quotation reported being $12.75 per picul equivalent.

Padi.—There is little to add to the general review of the position given last month.

In Kedah, flowering has commenced in the north and a little reaping has been done in the earliest planted areas, but transplanting was still proceeding in some areas in the south. In the Sungei Acheh area of Province Wellesley planting has been delayed owing to lack of seedlings, heavy rain in October having damaged the plants in many of the nurseries.

In Selangor, harvesting has begun in the Districts of Kuala Langat, Ulu Langat and Kuala Lumpur.

Harvesting is in progress also in the Tampin, Gemas and Jelebu Districts of Negri Sembilan and is practically completed in the down-river mukims of Lipis District and in Raub District and has begun in Temerloh and the up-river mukims of the Pekan District.

In Kelantan the comparatively light rainfall of the past two months allowed the short season wet padi planted in the alors to be reaped under better conditions than usual but, on the other hand, these conditions were not suitable for either the main crop of wet padi or the dry padi.

Pineapples.—The feature of the month has been the continued weakness of the market for canned pineapples, the price of golden spiral cut slices having been as low as $2.95 per case of 72 pounds. Prices of the fruit delivered at the factory have ranged from 70 cents to $1.20 per hundred. The price to the grower would be at least 20 cents less than these quotations. The one redeeming feature is that the great majority of pineapples now being canned are of full golden colour, as the growers have no incentive to harvest their fruit before they are fully ripe.

Agricultural and Padi Stations.

Agricultural Stations.—Work was begun on the erection of new cooly lines at the Gaja Mati Station in Kedah. At Kuala Kangsar Station in Perak some 1,200 seedlings of durians, rambutans, avocado pear and kapok were budded during the month with some 46 percentage of success.

At Cheras Station in Selangor the poultry Rhode Island Red Air Mail cock x McEntire strain has given very much better birds and pullets than the two other strains used.

In Kelantan a site has been selected for a Station for experiments with dry padi and fodder crops.

Padi Stations.—There is nothing of special interest to record.

RENT ON LAND PLANTED WITH COCONUTS AND OIL PALMS IN THE F.M.S.

It is notified for general information that the concessions at present in force in the Federated Malay States in respect of rent on lands planted with coconuts and oil palms will be discontinued with effect from the 1st January, 1938, inclusive, from which date the full rent reserved in the documents of title, subject to any rebate provided for under the Land Rules, will be payable.

DEPARTMENTAL NOTES.

Retirement of Mr. J. Lambourne.

Mr. John Lambourne, Assistant Agriculturist, retired on the 4th November, 1937, after over 25 years service in the Department of Agriculture, S.S. and F.M.S.

Mr. Lambourne was trained at the Royal Botanic Gardens, Kew, and came to Malaya to join the Department in March, 1912, as Assistant Superintendent, Government Plantations.

In 1922-23, he took a special course in Agriculture at Cambridge University. In October, 1924, he was promoted to Assistant Agriculturist.

Mr. Lambourne was in charge of Castleton Estate, Telok Anson, from the end of 1914 for several years and afterwards in charge of the Government Coconut Experimental Plantation, which was known as Sapintas Estate and situated on the Bernam River. Subsequently he worked for a time with the Agriculturist at Headquarters, and finally he was transferred to the Central Experiment Station, Serdang, where he was placed in charge of the East Division. He was also responsible for the supervision of all the work on fruit propagation undertaken in the extensive fruit nurseries at Serdang.

His contributions to the publications of the Department of Agriculture are evidence of the valuable work he completed on a diversity of subjects connected with tropical agriculture.

His colleagues wish Mr. and Mrs. Lambourne many happy years of retired life.

Appointments.

Mr. A. B. Lucy, B.Sc., A.R.C.S., has been appointed to be an Agricultural Officer, Department of Agriculture, Straits Settlements and Federated Malay States, with effect from 10th September, 1937. Mr. Lucy arrived in Malaya on 7th October, 1937, and assumed duty with effect from 8th October, 1937.

Mr. E. F. Allen, B.A. (Cantab.) has been appointed to be an Agricultural Officer, Department of Agriculture, Straits Settlements and Federated Malay States, with effect from 24th September, 1937. Mr. Allen arrived in Malaya on 21st October, 1937, and assumed duty with effect from 22nd October, 1937.

Mr. Allen has been appointed to officiate as Agricultural Officer, Perak Central, with effect from 21st October, 1937, inclusive.

Leave.

Mr. G. H. Corbett, Senior Entomologist, returned from leave on 18th November, 1937, and assumed the duties of his appointment, from which date Mr. N. C. E. Miller, acting Senior Entomologist, resumed the duties of his substantive appointment of Entomologist.

MEETING OF THE AGRICULTURAL ADVISORY COMMITTEE HELD ON 10th NOVEMBER, 1937.

Under the chairmanship of the Adviser on Agriculture, (the Hon'ble Mr. O. T. Faulkner, C.M.G.) a meeting of the Agricultural Advisory Committee was held on 10th November 1937 at the Department of Agriculture, Kuala Lumpur.

In addition to the routine business a number of subjects were discussed, amongst which the following are the more important.

Pineapple Industry.—A site for the laboratory and model canning factory has been selected in Johore and it is hoped that the erection of the laboratory will commence shortly.

Agreement by the trade has now been reached on the subject of standardization of can sizes, and at a meeting of Singapore packers held recently, packers requested that the standards be gazetted as soon as possible.

All details of the Malayan Mark Scheme for canned pineapples have finally been settled, with the exception of the constitution of the Advisory Committee.

Co-operation with the Rubber Research Institute.—At the invitation of the Chairman, the Director, Rubber Research Institute of Malaya, outlined the present scheme of co-operation between the Department of Agriculture and the Rubber Research Institute of Malaya. He stated that much work had been done in connexion with developing small-holders' rubber instruction in co-operation with the Department of Agriculture. The original cadre of 24 Asiatic Rubber Instructors is now complete, but it is considered that there is scope for further extension. The average area of rubber under each Asiatic Rubber Instructor is nearly 50,000 acres, consisting of something like 12,000 to 13,000 small holdings. It is now considered desirable to double the present cadre of Malay Rubber Instructors and it is suggested that three or four recruits should be added each year.

A small-holders' planting manual, prepared jointly by the Rubber Research Institute and the Department of Agriculture, to be entitled "Elementary Principles of Rubber Planting" is in course of preparation. This will be published in English, Malay and Chinese, and certain sections in Tamil.

It is proposed that a demonstrator should be attached to the Asiatic Rubber Instructor in Kelantan for the purpose of following up the latter and giving repeated demonstrations in the preparation of sheet. If this experiment is successful it may be extended to other areas on the east coast. The appointment of an additional European assistant at the headquarters of the Institute for the purpose of taking charge of the work of the Asiatic Rubber Instructors is now being considered.

The question of trying to do something to assist the small-holder who produces good smoked sheet to obtain the full premium for it is to be discussed between the Institute and the Department.

Scholarships at the School of Agriculture, Malaya.—The Chairman reports that at present in the Federated Malay States scholarships are granted to Malays only. Government has approved the creation of four scholarships open to anyone, Malay or non-Malay, next year. It is hoped that the training of Chinese and

Tamils will fit them for posts as conductors on estates. The Straits Settlements scholarships are open to boys of any nationality.

Amongst other subjects discussed by the Committee may be mentioned the following:— the coconut industry, progress of negotiations concerning tea control, oil palm planting, the Stock Farm at Serdang, farm schools and post-vernacular school courses, soil erosion, legislation, and staff.

SALE OF SELECTED OIL PALM SEEDS.

In order to ensure the supply of selected oil palm seed, arrangements have been made at the Central Experiment Station, Serdang, to harvest seed from controlled pollinated high-yielding palms and controlled pollinated second generation palm families raised from high-yielding palms.

Yields from the selected palms have been recorded over a period of ten years and range from 300 to 500 lbs. fruit bunches per annum. Seed from controlled pollinations of these high-yielding palms are booked until August, 1938. A limited supply of seed will be available after that date.

Seed from pollinated second generation palms in an isolated block raised from the above-mentioned high-yielders is available now in limited quantity. Controlled pollination has been undertaken in this block since October, 1937, and from April, 1938 onwards seed should be forthcoming from controlled pollinated palms in this area in considerable quantity.

Price of selected oil palm seed is $25 per 1,000, packing and delivery to nearest railway station free. For orders of 10,000 and over $20 per 1,000.

Statistical.

MARKET PRICES.

November, 1937.

Major Crops.

Rubber.—The rubber market fell heavily during November, reaching the lowest level recorded since 1935, but rallied at the close in anticipation of the meeting of the Regulation Committee. Spot loose opened at 25 cents per lb., and fell to 22⅛ on the 9th November. There was a slight recovery followed by further weakness, the price hardening in the last week of the month to close at 23⅝.

The average price for the month for No. 1. X. Rubber Smoked Sheet was 23.20 cents per lb. as compared with 26.28 cents in October. The London average price was 7.06 pence per lb., and the New York price 14.43 cents gold, as compared with 7.87 pence and 16.27 cents gold in October.

Table I shews prices paid for small-holders' rubber at three centres during the month.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, November, 1937.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.			Batu Pahat, Johore.			
	4	11	18	25	10	17	24	3	10	17	24
Smoked sheet	28.65	27.22	27.50		26.56	27.00			25.60		25.90
Unsmoked sheet	26.88	26.00	26.00	25.00	23.50			26.40	23 80	23.70	24.70
Scrap							20.00				

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Kuala Kangsar on the 3rd November.

Palm Oil.—The market for palm oil weakened at the close of November and the prices obtained for Malayan oil and kernels are shewn in Table II.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1937.	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
November 5	£ 18. 0. 0	£ 10. 15. 0
,, 12	18. 0. 0	10. 5. 0
,, 19	18. 0. 0	10. 10. 0
,, 26	17. 10. 0	10. 2. 6

Copra.—The copra market weakened considerably during the month, reaching the lowest level of the year. The sun-dried grade opened at $5.15 per picul and fell almost steadily throughout the month to close at $4.55. The average price for the month was $4.85 per picul and for the mixed grade $4.60. The October average prices were $5.36 and $5.11 per picul respectively.

Copra cake continued to be quoted throughout the month at $2.40 per picul.

Rice.—The average wholesale Singapore prices of rice per picul in October were as follows:— Siam No. 2 (ordinary) $4.39, Rangoon No. 1 $4, Saigon No. 1 $3.97, as compared with $4.57, $3.92 and $4.12 in September, 1937, and $3.71, $3.30 and $3.40 in October 1936.

The average retail prices in cents per gantang of No. 2 Siam rice in October were: Singapore 31, Penang 35, Malacca 34, as compared with 34, 37 and 34 respectively in September.

The average declared trade value of imports during October was $4.09 per picul, as compared with $4.20 in September, and $3.97 in August.

Padi.—The price paid for padi at the Government Rice Mills, Perak, remained unchanged at $2 per picul. Retail prices ranged from 7 to 16 cents per gantang.

Pineapples.—In the second half of the month prices were reduced considerably by the packers, and were below cost of production. Canners are faced with the alternatives of meeting a falling market or ceasing to operate. Producers are said to be selling their crop for practically nothing.

Closing prices per case were: G.A.Q.: Cubes $2.70, Sliced Flat $2.65, Sliced Tall $2.80; Golden Quality: $2.85, $2.80 and $2.95 respectively.

Prices of fresh fruit per 100 during November were as follows:—Selangor 55 to 80 cents; Singapore 70 cents to $1.20; Johore 1st quality 60 cents to $1.20, 2nd quality 40 to 80 cents, 3rd quality 30 to 55 cents.

Beverages.

Tea.—Eight consignments of Malayan tea were sold on the London market during November. Two consignments were of upland tea and were sold at 1s. 3¼d. and 1s. 3¾d. per lb. The remaining lowland tea averaged from 1s. 1d. to 1s. 2½d. per lb.

Average London prices per lb. during November for consignments of tea from other countries were as follows: Ceylon 1s. 3.86d., Java 1s. 1.86d., Indian Northern 1s. 2.85d., Indian Southern 1s. 2.98d., Sumatra 1s. 0.45d.

The latest Colombo average prices available, quoted from *The Weekly Tea Market Report,* 30th November 1937, of the Colombo Brokers' Association, are as follows, in rupee cents per lb.,:— High Grown Teas 77 cents, Medium Grown Teas 74 cents, Low Grown Teas 69 cents.

Coffee.—Prices of Sourabaya coffee in Singapore shewed a slight improvement during the month, while Palembang coffee was marked down. Average Singapore prices per picul during November were:—Sourabaya $13.12 to $14.25; Palembang $9.31 to $8.25.

Prices in Singapore of other varieties of coffee were as follows (per picul): Liberian steady at $15; Excelsa commencing at $11, rising to $12, but closing at $11; Robusta, steady at $9, till the end of the month when the price dropped to $8.

Spices.

Arecanuts.—The following was the range of Singapore average prices per picul during November:—Splits $6 to $8.25; Red Whole $5.62 to $6.62; Sliced $8.25 to $9.19.

The average of the Singapore Chamber of Commerce quotations per picul were:—Best $8.44, Medium $8, Mixed $7.44.

Pepper.—With no business passing prices fell still further during November. Average prices per picul were:—Singapore Black $8.75, Singapore White $13.75, Muntok White $14.25, as compared with $9.65, $15.30 and $15.80 respectively in October.

Nutmegs.—Prices remained unchanged at $40 per picul for both 110's and 80's.

Mace.—Siouw was quoted throughout the month at $110 per picul, and Amboina at $88, as compared with average prices of $108 and $87.40 respectively in October.

Cloves.—Quotations continued nominal at $40 per picul.

Cardamoms.—Green cardamoms were quoted in the Ceylon Chamber of Commerce Reports for November at Rs. 2.05—Rs. 2.26 on opening, but fell heavily to Rs. 1.04—Rs. 1.70 on the 22nd, closing at Rs. 1.15—Rs. 1.35.

Miscellaneous.

Derris (Tuba Root).—The Singapore market continued dull during November and prices were maintained at a lower level, averaging $26 per picul for roots sold on rotenone content and $16 on an ether extract basis. Corresponding prices in October were $31 and $18 per picul.

Gambier.—No. 1 Cube improved slightly, averaging $15.31 per picul as compared with $15.30 in October, but Block weakened to average $8.50 per picul as against $9.40 in the previous month.

Tapioca.—Prices fell during November and average prices per picul were:— Flake Fair $4.78, Seed Pearl $5.02, Medium Pearl $5.32, as compared with $5.16, $5.22 and $5.56 respectively in October.

Sago.—Prices fell still further during the month. Pearl, Small Fair, averaged $4.89 per picul, and Flour, Sarawak Fair, $2.89, as compared with $5.26 and $3.10 respectively in October.

Tobacco.—The range of prices per picul for dried leaf was as follows:— 1st quality $24 to $40, 2nd quality $15 to $32.50, 3rd quality $10 to $24. In Negri Sembilan, the range for prepared tobacco was: $55 to $70, $45 to $58, $40 to $56, and in Kelantan $100, $75 to $90, and $50 to $70.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for imported coffee and arecanuts by the Lianqui Trading Company of Singapore, and derris prices by Messrs. Kohyei & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and fourpence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57 Trafalgar Square, London, W.C. 2

GENERAL RICE SUMMARY*

October, 1937.

Malaya.—Imports of foreign rice during October 1937 were 52,721 tons,† and exports 15,460 tons; net imports were therefore 37,261 tons as compared with 48,912 tons in 1936. Net imports from January to October totalled 489,448 tons, as compared with 440,545 tons in 1936.¶

Of the October imports, 45 per cent. were consigned to Singapore, 19 per cent. to Penang, 8 per cent. to Malacca, 20 per cent. to the Federated Malay States and 8 per cent. to the Unfederated Malay States.

The origin of net imports for the period January to October 1937 was as follows (in tons, percentages in brackets):—Siam 244,252 (49.9), Burma 216,541 (44.2), French Indo-China 20,507 (4.2), elsewhere 8,148 (1.7).

Of the exports during October 1937, 79 per cent. were consigned to the Netherlands Indies and 21 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets):—Siam 10,686 (69.1), Burma 3,435 (22.2), French Indo-China 1,229 (8.0), parboiled 73 (0.5), Malayan production 37 (0.2).

India and Burma.—Foreign exports for the period January to September 1937 totalled 641,000, as compared with 1,049,000 tons in 1936, a decrease of 38.9 per cent. Of these exports, 4.1 per cent. were to the United Kingdom, 5.9 per cent. to the Continent of Europe, 28.4 per cent. to Ceylon, 22.0 per cent. to the Straits Settlements and the Far East and 39.6 per cent. to other countries. The corresponding 1936 percentages were 3.5, 17.0, 29.0, 21.7, and 28.8.

According to the first rice forecast 1937-38 (*Indian Trade Journal* dated 28th October, 1937) for All-India (excluding Burma), the total area is estimated at 64,846,000 acres as compared with 65,125,000 acres (revised) for the season 1936-37, a decrease of 0.4 per cent. The condition of the crop is, on the whole, good.

According to the first forecast of the rice crop in Burma for the season 1937-38, dated 15th October 1937, the area likely to mature is estimated at 12,443,800 acres, an increase of 335,900 acres or 2.8 per cent., as compared with the final figures for the season 1936-37.

The monsoon has been generally favourable and agricultural operations were for the most part normal. The middle rains were excessive and caused flooding and washing out in parts of some districts. Most of the flooded areas have, however, been replanted. The increase in the matured area is mainly due to decreases in the estimated areas destroyed. The rainfall this year has been in excess of normal and standing crops are in good condition and only a few timely showers are now required to ensure a good crop.

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* Abridged from the Rice Summary for October 1937, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Ton = long ton (2,240 lbs.)

¶ It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1936.

Siam.—Exports of rice and rice products from Bangkok during August were 70,764 tons, as compared with 134,826 tons in 1936; the cumulative total for the period January to August 1937 was 640,032 tons as compared with 1,078,851 tons in 1936.

The second report of the rice crop of Siam for the season 1937-38, issued by the Department of Agriculture and Fisheries, Bangkok, on 18th November 1937 and based on telegraphic reports from 60 provinces, states that the cultivated area is 7,270,888 acres as compared with 6,944,915 acres at the corresponding time in 1936. The total damaged area is about 614,865 acres as compared with 865,978 acres in 1936.

The crop is reported to be doing well in 25 provinces, doing fairly well in 29 provinces and not doing well in 5 provinces.

Japan.—According to the *Trans-Pacific Journal* of 14th October 1937, the area under rice in Japan is 7,871,365 acres, an increase of 21,031 acres over the last season.

The supply and demand of rice for the 1937-38 rice year, which began on November 1st, shews that the estimated rice crop will yield 9,396,000 tons. Imports from Korea are estimated at 1,192,000 tons and from Formosa 701,000 tons. Stocks, Japan production and imports are estimated to make an available supply of 12,453,000 tons. Consumption is estimated at 10,589,000 tons; this, with small exports, gives a total demand for 10,666,000 tons which will leave stocks at the 1937-38 between season of 1,787,000 tons.

Formosa.—An estimate of the Formosan rice crop based on the conditions on October 15th, gives the area planted as 895,431 acres and an estimated production of 703,029 tons. These figures shew a decrease of 43,374 acres but an increased crop of 27,058 tons over the actual production of the same crop for 1936. Production figures of the different varieties are given as follows:—"Horai" rice 288,600 tons, Formosan rice (wet) 389,305 tons, Formosan rice (dry) 25,124 tons.

Although growth of the rice plants in the North was somewhat checked by low temperatures and continued rainy weather, and in the Centre and South by insect pests and disease, the crop was favoured by the lateness of the monsoon.

French Indo-China.—Entries of padi into Cholon from January to October inclusive were 1,296,488 tons as compared with 1,380,620 tons in 1936, a decrease of 6.1 per cent. Exports of rice during the same period were 1,326,493 tons, as compared with 1,496,509 tons for 1936, a decrease of 11.4 per cent.

Rice exports for October 1937 were 109,896 tons, bringing the total of the year to date to 1,326,493 tons as compared with 1,496,509 tons for 1936. France has taken 594,181 tons in 1937 as compared with 854,494 tons for the same period of 1936.

Padi sold at $2.24 per picul on the 1st October, $2.29 in mid-month and closed at $2.21

The Netherlands Indies.—According to *The Netherlands Economic Bulletin* for July and August 1937, the area of rice harvested in Java and Madoera amounted to 7,202,520 acres for the period January to June 1937, as compared with 7,145,710

acres in 1936. Imports of rice into the Netherlands Indies were 116,270 tons for the period January to June 1937 as compared with 158,723 tons in 1936.

Ceylon.—Imports of rice from January to October 1937 inclusive were 443,959 tons as compared with 435,247 tons in 1936 an increase of 2 per cent. Of these imports 17.2 per cent. were from British India, 70.0 per cent. from Burma 0.1 per cent. from the Straits Settlements and 12.7 per cent. from other countries. Corresponding figures in 1936 were 13.9, 62.8, 0.5 and 22.8.

Europe and America.—Shipments from the East to Europe from 1st January to 3rd October 1937 were 968,371 tons as compared with 1,078,447 tons in 1936, a decrease of 10.2 per cent. Of these shipments, 43.1 per cent. were from Burma, 50.7 per cent. from Saigon, 4.4 per cent. from Siam and 1.8 per cent. from Bengal. Corresponding percentages for 1936 were 26.8, 63.8, 8.6 and 0.8.

Shipments to the Levant from 1st January to 5th October 1937 were 14,424 tons as compared with 12,355 tons in 1936, an increase of 16.7 per cent.

Shipments for Cuba, West Indies and America from 1st January to 1st October 1937 were 209,890 tons, as compared with 220,168 tons in 1936, a decrease of 4.7 per cent.

FERTILIZER PRICES, NOVEMBER, 1937.

The following are the prices at the end of November, 1937, of some of the more important fertilizers. All quotations are ex Port Swettenham, F.M.S., or Singapore.

Product.	Analysis				Price per ton $
	Nitrogen (N)	Phosphoric Acid (P_2O_5)		Potash (K_2O)	
		Soluble	Insoluble		
Sulphate of Ammonia ...	20	—	—	—	72.75
Calcium Cyanamide ...	20.6	—	—	—	80.00
Muriate of Potash ...	—	—	—	50	112.00
Sulphate of Potash ...	—	—	—	48	112.00
Superphosphate (concentrated) ...	—	39 - 40	—	—	105.00
Superphosphate ...	—	16 - 18	—	—	60.00
Basic Slag ...	—	16	—	—	48.00
Rock Phosphate (Christmas Island) ...	—	11*	38‡	—	33.50
Rock Phosphate (very finely ground Gafsa) ...	—	11*	26 - 28‡	—	40.00
Lime ...	—	—	—	—	20.00

* Citric soluble. ‡ Total.

MALAYAN AGRICULTURAL EXPORTS, OCTOBER, 1937.

PRODUCT.	Net Exports in Tons				
	Year 1936	Jan.-Oct. 1936	Jan.-Oct. 1937	October, 1936	October, 1937
Arecanuts ...	26,548	23,781	24,751	2,543	1,510
Coconuts fresh † ...	114,314†	98,769†	79,322†	5,744†	9,835†
Coconut oil ...	46,507	39,291	32,950	4,472	3,429
Copra ...	76,681	62,744	56,796	6,631	6,625
Gambier, all kinds ...	2,188	1,759	1,645	165	109
Copra cake § ...	20,438§	16,873§	12,505	1,418	1,495
Palm kernels ...	4,964	4,133	5,418	713	777
Palm oil ...	29,296	23,772	35,539	2,682	4,460
Pineapples canned ...	76,403	67,803	71,539	3,912	2,765
Rubber ¶ ...	365,005¶	301,958¶	409.764¶	36,799¶	42,872¶
Sago,—flour ...	6,180	6,239	13,116	363*	2,719
,, —pearl ...	3,319	2,794	3,119	353	556
,, —raw ...	7,484*	6.059*	6,803*	565*	852*
Tapioca,—flake ...	1,535	1,303	924	87	86
,, —flour ...	2,418*	1,603*	1,849	201*	171*
,, —pearl ...	17,797	14,702	14,021	1,836	1,170
Tuba root ...	599	516	515	26	35

† hundreds in number. * net imports. ¶ production. § gross exports.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates)

Month 1937	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January ...	1,984.8	865.0	360.4	156.0
February ...	1,759.6	1,851.8	323.6	308.7
March ...	1,798.4	1,473.4	358.7	256.1
April ...	1,573.1	1,237.2	308.0	226.0
May ...	1,587.6	1,285.2	257.8	186.4
June ...	1,671.8	1,611.7	288.9	252.5
July ...	2,651.0	1,860.5	411.6	269.6
August ...	3,767.7	1,762.2	616.8	274.0
September ...	3,179.5	1,492.5	621.6	247.1
October ...	3,037.6	1,393.9	569.1	216.1
Total ...	23,011.1	14,833.4	4,116.5	2,392.5
Total January to October, 1936	19,337.3	6,886.5	3,136.4	1,055.8
Total for the year 1936 ...	23,081.2	8,812.3	3,791.0	1,340.7

Stocks on estates at the 31st October, 1937 were: palm oil 4,204 tons; palm kernels 783 tons.

MALAYAN RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER ACTUALLY TAPPED AND NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST OCTOBER, 1937.

STATE OR TERRITORY	Estimated Acreages of Tappable Rubber	Actual area tapped during the month Acreage	Percentage of (3) to (2)	ACREAGES OF TAPPABLE RUBBER NOT TAPPED				AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total area not tapped (5) + (7)	Percentage of (11) to (2)
				ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)					
				Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)	Acreage	Percentage of (9) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
STRAITS SETTLEMENTS :—											
Province Wellesley ...	43,387	28,175	64.9	—	—	15,212	35.1	318	0.7	15,212	35.1
Malacca ...	123,357	87,376	70.8	355	0.3	35,626	28.9	2,433	2.0	35,981	29.2
Penang Island ...	2,599	1,843	70.9	—	—	756	29.1	75	2.9	756	29.1
Singapore Island ...	33,120	21,185	64.0	1,236	3.7	10,699	32.3	125	0.4	11,935	36.0
Total S.S. ...	202,463	138,579	68.4	1,591	0.8	62,293	30.8	2,951	1.5	63,884	31.6
FEDERATED MALAY STATES :—											
Perak ...	291,377	220,838	75.8	1,818	0.6	68,721	23.6	7,078	2.4	70,539	24.2
Selangor ...	331,732	260,333	78.5	1,271	0.4	70,128	21.1	7,795	2.3	71,399	21.5
Negri Sembilan ...	259,382	193,157	74.5	2,214	0.8	64,011	24.7	8,296	3.2	66,225	25.5
Pahang ...	85,040	64,147	75.4	3,911	4.6	16,982	20.0	9,121	10.7	20,893	24.6
Total F.M.S. ...	967,531	738,475	76.3	9,214	1.0	219,842	22.7	32,290	3.3	229,056	23.7
UNFEDERATED MALAY STATES :—											
Johore ...	474,185	356,656	75.2	3,012	0.6	114,517	24.2	35,430	7.5	117,529	24.8
Kedah ...	197,893	150,477	76.0	3,301	1.7	44,115	22.3	7,051	3.6	47,416	24.0
Kelantan ...	28,324	22,713	80.2	403	1.4	5,208	18.4	3,135	11.1	5,611	19.8
Trengganu (b) ...	4,817	3,172	65.9	—	—	1,645	34.1	100	2.1	1,645	34.1
Perlis ...	1,330	689	51.8	—	—	641	48.2	107	8.0	641	48.2
Brunei ...	5,569	3,776	67.8	1,125	20.2	668	12.0	754	13.5	1,793	32.2
Total U.M.S. ...	712,118	537,483	75.5	7,841	1.1	166,794	23.4	46,577	6.5	174,635	24.5
Total Malaya ...	1,882,112	1,414,537	75.2	18,646	1.0	448,929	23.8	81,818	4.3	467,575	24.8

Notes :—(a) Area out of tapping on estates which have partly ceased tapping refers to areas definitely being rested and includes areas rested under rotational systems, but excludes areas on any tapping round in respect of Perlis only.
(b) Registered companies only.

MALAYAN RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF OCTOBER, 1937, IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		Jan. to Oct. 1937		during the month		Jan. to Oct. 1937						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to Oct. 1937	during the month	Jan. to Oct. 1937	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to Oct. 1937
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	6,431	14,066	14,981	136,110	8,232	74,224	Nil	Nil	Nil	Nil	16,481	3,483	150,874	53,821	...	8,908	14,823	15	158
Johore ...	...	1,707	4,576	6,393	58,692	3,526	41,444	Nil	30	Nil	2,309	3,395	5,166	34,126	67,514	...	2,594	5,077	...	...
Kedah ...	...	535	3,162	3,780	33,297	1,255	12,796	Nil	Nil	Nil	Nil	2,313	2,112	21,180	24,524	...	611	3,696	...	...
Perlis ...	...	10	10	21	150	21	245	Nil	Nil	Nil	Nil	Nil	29	Nil	384	...	17	16	...	...
Kelantan ...	...	705	291	401	3,717	530	8,055	Nil	Nil	Nil	Nil	351	639	3,208	8,111	...	592	345	...	...
Trengganu ...	...	55	50	264	2,955	132	1,478	Nil	Nil	Nil	Nil	Nil	396	Nil	4,433	...	55	50	...	...
Brunei ...	..	1	75	64	613	67	837	...	...	...	...	...	125	...	1,414	...	23	59	...	...
Total Malay States	...	9,443	22,230	25,904	235,534	13,763	139,079	Nil	30	Nil	2,309	22,540	11,950	209,388	160,201	...	12,800	24,066	15	158
S. SETTLEMENTS :—																				
Malacca ...	...	1,815	1,138	1,623	14,135	555	7,662	Nil		Nil		3,155		31,141		...	2,307	1,292	...	...
Province Wellesley ..	..	2,465	832	591	5,514	155	2,824	Nil		Nil		8,477		84,414		...	2,306	839	...	...
Penang ...	2,606	6,313	8	25	194	28	1,237	2,181	13,994	29,250	155,822		Ni		Nil	2,096	5,880	23	...	...
Singapore ...	7,817	32,712	171	202	1,850	25	1,551	9,651		157,323		25,147		242,954		5,735	28,254	235	33	322
Labuan ...	...	28	Nil	Nil	Nil	1	184	26		528		Nil		Nil		...	32	Nil	...	...
Total Straits Settlements ...	10,423	43,333	2,149	2,441	21,693	764	13,458	11,858	13,994	187,101	155,822	36,779	Ni	357,609	Nil	7,831	38,779	2,389	33	322
Total Malaya ...	10,423	52,777	24,379	28,345	257,227	14,527	152,537	11,858	14,024	187,101	158,131	59,319	11,950	566,997	160,201	7,831	51,579	26,455	48	480

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	7,480	27,580	5,686	4,403	1,914	204
WET RUBBER	1,428	674	194	265	680	407
TOTAL ...	8,908	28,254	5,880	4,668	2,594	611

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan. to Oct. 1937
29	30	31
Singapore ...	40,828	381,932
Penang ...	13,340	128,900
Port Swettenham.	4,880	53,941
Malacca ...	271	2,224
MALAYA ...	59,319	566,997

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan. to Oct. 1937
32	33	34
Malay States ...	34,477	367,144
Straits Settlements	2,535	34,202
MALAYA ...	37,012	401,346

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S and F.M.S., at Singapore on 24th November, 1937

METEOROLOGICAL SUMMARY, MALAYA, OCTOBER, 1937.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes									Number of days.							
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet	Total.		Most in a day. Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more	Total.	Daily Mean.	Per cent.
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hrs.	hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	89.3	71.8	80.5	93	69	83	73	83.2	84.5	12.35	313.7	2.14	23	18	4	10	1	139.90	4.51	37
Bukit Jeram, Selangor ...	88.2	72.3	80.3	92	70	85	74	83.8	86.1	6.76	171.7	2.01	18	17	2	2	1	160.60	5.37	44
Sitiawan, Perak ...	87.7	73.0	80.3	91	71	82	75	83.6	84.8	12.57	319.3	2.44	24	22	5			165.60	5.34	45
Temerloh, Pahang ...	89.1	72.3	80.7	92	70	85	74	85.1	86.3	6.08	154.4	1.24	18	13	4	2	1	156.65	5.05	42
Kuala Lipis, Pahang ...	88.6	71.5	80.1	93	70	78	73	84.2	85.0	9.00	228.6	2.24	21	17		24		164.20	5.30	44
Kuala Pahang, Pahang ...	86.1	73.7	79.9	90	72	82	75	83.8	86.4	10.43	264.9	1.60	24	19			1	157.45	5.08	42
Kallang Aerodrome, S'pore ...	85.3	75.4	80.3	88	72	82	78	82.5	83.5	3.54	89.9	1.12	18	11	4	1	1	152.00	4.90	40
Butterworth, Province Wellesley † ...																				
Bayan Lepas Aerodrome Penang ...	86.3	74.2	80.3	89	71	82	79	83.1	84.1	21.31	541.3	3.83	25	22	4			178.60	5.76	48
Bukit China, Malacca ...	85.0	74.0	79.5	88	72	81	76	82.7	83.9	11.73	297.9	2.65	19	16	1		1	153.65	4.96	41
Kluang, Johore ...	87.3	71.3	79.3	92	69	81	74	81.5	82.3	9.44	239.8	1.34	25	23	11	7	1	125.80	4.06	33
Bukit Lalang, Mersing, Johore	86.3	71.7	79.0	91	69	81	74	81.7	82.0	10.35	267.5	1.75	23	19	3		2	142.80	4.61	38
Alor Star, Kedah ...	87.0	73.7	80.3	91	72	83	76	83.7	85.1	7.00	177.8	1.19	21	20				182.90	5.90	49
Kota Bahru, Kelantan ...	87.3	73.2	80.3	92	71	78	75	84.1	85.0	8.41	213.6	1.62	21	15	1			176.80	5.70	47
Kuala Trengganu, Trengganu	86.3	73.1	79.7	91	71	75	75	82.7	84.4	12.65	321.3	5.14	21	19	2		1	184.40	5.95	49
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	73.5	62.5	68.0	79	60	69	65	71.9	72.8	11.71	297.4	2.00	26	25	5	9	2	125.65	4.05	34
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	70.9	57.8	64.3	75	49	64	62	70.3	70.6	14.50	368.3	2.05	25	22		1	5	104.45	3.37	28
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	70.5	58.8	64.6	75	53	63	61			14.44	366.8	1.84	23	22		1	5	106.85	3.45	29

Compiled from Returns supplied by the Meteorological Branch, Malaya.
† Station closed on 17th October, 1937.